STOPPING
WATER POLLUTION
AT ITS SOURCE

MISA
Municipal/Industrial Strategy for Abatement

DEVELOPMENT DOCUMENT FOR THE INORGANIC CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

Ontario

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DEVELOPMENT DOCUMENT

FOR THE

INORGANIC CHEMICAL SECTOR

EFFLUENT LIMITS REGULATION

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DEVELOPMENT DOCUMENT

FOR THE

INORGANIC CHEMICAL SECTOR

EFFLUENT LIMITS REGULATION

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PREFACE

The Municipal-Industrial Strategy for Abatement (MISA) program was officially announced by the Ontario Ministry of the Environment in June, 1986. MISA is a regulatory program for reducing water pollution from both industrial and municipal dischargers. The ultimate goal of MISA is the virtual elimination of persistent toxic contaminants from all discharges into Ontario's waterways.

Under the industrial part of the MISA program, technology-based effluent limits are being imposed on industrial direct dischargers as a minimum pollution control requirement. In addition, more stringent effluent limits may be imposed on a site-specific basis in order to provide for additional protection of sensitive receiving waters. The industrial direct dischargers were grouped into nine MISA Sectors according to the products that they manufactured.

There are two regulatory phases in the MISA program. In the first phase, under the Effluent Monitoring Regulation, direct dischargers were required to monitor their effluents for a period of twelve months for a list of specified parameters. In the second phase, effluent limits are being developed for the dischargers on the basis of the effluent monitoring database and Best Available Technology Economically Achievable (BATEA).

This document describes the steps involved and the technical rationale used in the development of effluent limits for one of the nine MISA Sectors - The Inorganic Chemical Sector (ICS). Its purpose is to assist the reader in gaining a greater understanding of the regulatory requirements for the ICS and how they were derived.

The information in this document is organized into six chapters and three appendices.

Chapter One presents a short summary of the MISA program along with a brief introduction to the effluent limits regulation development process.

Chapter Two presents information on the ICS plants. The Sector currently consists of twenty-three plants with direct effluent discharges. The plants range from small single product facilities such as abrasives, carbon dioxide and sulphuric acid plants to large multi-product facilities such as the fertilizer plants. Information is provided on plant location, number of employees, major raw materials, products and wastewater management and treatment.

Chapter Three describes the pre-regulation effluent monitoring program and the one year effluent monitoring regulation for the ICS. Results of the monitoring program are also discussed.

Chapter Four describes the process used for determining Best Available Technology (BAT) for the ICS. It also includes a description of the economic assessment which was conducted as part of the process to select the Best Available Technology Economically Achievable (BATEA).

Chapter Five describes the process for selecting parameters for limits. Each step in the process is documented and the methods used to calculate effluent limits are explained.

Chapter Six presents a summary of the key components of the ICS Effluent Limits Regulation. Loading compliance requirements are explained, as are other regulatory requirements such as toxicity testing, flow measurement and reporting.

Appendices A and B provide detailed information on the selection of parameters for limits and the current and BAT treatment performance for each plant.

A copy of the Limits Regulation for the ICS is provided in Appendix C.

As part of the consultative process, the draft limits regulation is being released for a sixty day public review period in order to fully solicit public input and comment.

EXECUTIVE SUMMARY

This document describes the steps involved in the development of effluent limits for the Inorganic Chemical Sector (ICS) under the Municipal-Industrial Strategy for Abatement (MISA) Program of the Ontario Ministry of Environment and Energy.

Under the Effluent Monitoring Regulation for the ICS, twenty-two plants were required to monitor their effluent streams for a one year period commencing December 1, 1989, while an additional six industrial gas plants commenced monitoring on February 1, 1990.

The results from the twelve months of regulatory monitoring were used as the basis for the selection of parameters for effluent limits. A total of one hundred and fifty-four parameters were specified for monitoring in the Monitoring Regulation. Of this total, one hundred were "found" in ICS effluent streams.

Quality assurance/quality control (QA/QC) monitoring data from each plant were examined to determine if the effluent monitoring data were acceptable for use in the development of effluent limits. Parameters were removed from further consideration if the QA/QC data assessment showed that their presence in the effluent was highly suspect or if the data were of limited or unreliable quality for the purposes of effluent limits setting.

Information on world-wide Best Available Technology (BAT), applicable to ICS plants was obtained by a consultant hired by the Ministry. The consultant also obtained information on the predicted performance and cost of the BAT and on the current status of ICS plants with respect to BAT treatment.

Up to five BAT options were recommended by the consultant for each of the ICS plants. Due to the diversity of plants within the Sector, the specific technology recommendations were largely site dependent. The following criteria were used to differentiate the five BAT Options:

- BAT Option 1 - achieves non-lethality to fish and Daphnia magna;
- BAT Option 2 - allows ICS plants to meet U.S. EPA limits regulations for similar plants in the U.S.;
- BAT Option 3 - uses the best technology currently in Ontario;
- BAT Option 4 - provides the maximum overall removal of contaminants;
- BAT Option 5 - any current technology or combination of current technologies which will advance ICS plants the furthest toward virtual elimination and the ultimate goal of zero discharge of contaminants.

Pollution prevention measures were considered as integral first steps in the development of BAT options. Where practical pollution prevention measures were unavailable, in-plant controls and end-of-pipe treatment were considered.

In order to select the BAT Option on which to develop effluent limits for the Sector, the Ministry conducted an economic assessment of the costs of imposing each of the five recommended BAT Option technologies for each of the ICS plants.

At the outset, the General Chemical Canada Ltd., plant at Amherstburg was singled out as a special case because the only BAT technology identified to ensure that the plant's North Drain discharge was non-toxic was evaporation. However, the capital and operating costs of the technology estimated at $27 million and $233 million per year respectively, made it economically unachievable. The use of options such as in-process changes or effluent blending to make the North Drain non-toxic was studied by an outside consultant. The study concluded that neither blending nor in-process changes could guarantee compliance with the toxicity requirements for the North Drain. Therefore, all discussions of Sector costs exclude costs associated with General Chemical.

The results of the economic assessment indicate that with the exception of one plant, Nutrite Inc., BAT Options 1 and 2 will not affect the financial position of the ICS.

The economic impact of BAT Option 3 was not assessed as it applied to only one Sector plant.

For BAT Option 4, three plants, Cytec, Nutrite and ICI (Cornwall), account for $ 10 million of the $17 million capital cost estimated for the whole Sector. Excluding these three plants, the average after-tax annualized cost to all other firms in the Sector required to install technology is less than $ 0.1 million. For the Sector overall, costs incurred will have some effect on the Sector's overall financial performance. BAT Option 4 will result in an estimated overall loadings reduction of 22%.

BAT Option 5, requiring annualized after-tax expenditures of $86 million per year, would cause a large reduction in both cash-flow and net income for many firms. The financial viability of several firms would also be affected. While this option would reduce overall loadings by approximately 96%, the cost of achieving this reduction would impose a severe hardship on the Sector.

It was concluded that, on the basis of cost effectiveness, BAT Option 4 is the preferred option on which to develop discharge limits for the ICS.

Following identification of the preferred BAT option, a six-criteria screening process, which is discussed in detail, was used to determine which of the found parameters at each plant would be limited.

Daily and monthly average loading limits based on BAT Option 4 performance were developed for the parameters selected for limits.

The ICS Limits Regulation, in addition to specifying individual plant loading limits, sets the following additional compliance requirements for all ICS plants:

- process and cooling water effluents must be non-acutely lethal to rainbow trout and Daphnia magna (water fleas);
- chronic toxicity testing must be performed on all process effluents following twelve consecutive months of acutely non-lethal test results;
- process effluents must be discharged within the pH range of 6.0 to 9.5.

ICS plants will have up to three years to come into compliance with the limits requirements. The three year period allows time to install capital equipment and to implement the necessary pollution prevention and control strategies.

Contaminant loading reductions for the Sector (excluding contributions from General Chemical Canada) after implementation of the limits regulation are estimated at about 2100 tonnes per year.

The proposed Effluent Limits Regulation for the ICS represents a significant step forward in the overall protection of human health and aquatic life in Ontario and is a step forward towards the Ministry's goal of the virtual elimination of persistent toxic substances.

CHAPTER 1

THE MISA INITIATIVE

DEVELOPMENT DOCUMENT FOR THE INORGANIC

CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

1.0 THE MISA PROGRAM

The Municipal-Industrial Strategy for Abatement (MISA) program was officially announced by the Ontario Ministry of the Environment in the White Paper of June 1986[1]. MISA is a regulatory program for reducing water pollution from both industrial and municipal dischargers. The ultimate goal of the MISA program is the virtual elimination of persistent toxic contaminants from all discharges into Ontario's waterways.

Under the MISA program for the Inorganic Chemical Sector (ICS), technology-based effluent limits are being imposed on each ICS plant with process effluent as a minimum pollution control requirement. In addition, more stringent effluent limits may be imposed on a site-specific basis in order to provide added protection to sensitive receiving waters.

The MISA program to develop technology-based effluent limits for the ICS involved two phases. In the first phase, an Effluent Monitoring Regulation which was promulgated in 1989, required each direct discharger in the ICS to monitor for a period of twelve months its point source effluent streams at regular intervals according to specific sampling and analytical protocols and procedures.

In the second phase, effluent limits were developed based on the effluent monitoring data and on Best Available Technology Economically Achievable (BATEA).

The Effluent Limits Regulation for the ICS was developed in consultation with industry and the public. Consultation has been facilitated through the ICS Joint Technical Committee (JTC) made up of representatives from industry, Environment Canada and the Ministry. Public consultation is being facilitated through a sixty-day public review and comment period.

The Ministry is committed to keeping abreast of available pollution prevention and control technologies. The Effluent Limits Regulation for the ICS will be reviewed in the future at regular time periods and tightened as new technology developments take place. Through this process of ongoing evaluation and step-by-step reductions, MISA's ultimate goal to virtually eliminate the discharge of toxic contaminants will be achieved. This goal is consistent with Ontario's commitment to the protection and improvement of our natural water resources, and is in step with the provisions of The Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem[2] and the Canada-United States Great Lakes Water Quality Agreement[3].

1.1 THE EFFLUENT LIMITS REGULATION DEVELOPMENT PROCESS

In 1989, the Ministry initiated the MISA Issue Resolution Process in order to establish standard procedures and criteria for the development of consistent and equitable effluent limits regulations. Special working groups called Issue Resolution Committees (IRCs) were formed. The working groups included representatives from the Ministry, industry and municipalities.

Environment Canada and the MISA Advisory Committee were asked to comment on the proposed effluent limits development process and their comments and concerns were carefully assessed in the final IRC deliberations.

The general process described in the IRC final report summary[4] and the IRC Committee Reports[5] was followed in developing the effluent limits regulation for the ICS. This process consisted of the following basic steps:

STEP 1: EFFLUENT MONITORING

Under the Effluent Monitoring Regulation for the ICS[6], direct dischargers were required to conduct one year of effluent monitoring for a comprehensive list of contaminants. On a Sector-wide basis, 154 parameters were monitored at daily, thrice-weekly, weekly, monthly, quarterly and semi-annual frequencies in process, combined, batch, cooling water, storm water, emergency overflow and waste disposal site effluents.

STEP 2: CANDIDATE PARAMETER SELECTION

Statistical tests were applied to the effluent monitoring data to determine candidate parameters for effluent limits setting. A monitored parameter was selected for consideration for effluent limits unless a proportion of 0.9 of the concentration results had values less than the Regulation Method Detection Limit (RMDL) for that parameter.

STEP 3: QA/QC DATA ASSESSMENT

Quality assurance/quality control (QA/QC) data were assessed to determine the suitability of the effluent monitoring data for use in limits setting. Data which were considered suspect or unreliable were eliminated from further consideration.

STEP 4: BEST AVAILABLE TECHNOLOGY (BAT) IDENTIFICATION

Through a consultant study[7], available pollution control technologies in the world were identified and screened on the basis of applicability and treatment effectiveness. Best available technologies were identified from the list of available technologies according to the criteria outlined in the Issue Resolution Committee Report on Best Available Technology[5].

BAT technologies were reviewed in order to identify their predicted performance and costs if retrofitted at Ontario ICS plants.

STEP 5: ECONOMIC ASSESSMENT

The performance and cost information for each BAT Option were used to derive abatement cost functions to show the relationship between increasingly stringent levels of control and the costs of achieving them. The financial and economic consequences

associated with imposing the different levels of control were used to determine the economic achievability and thus the preferred BAT Option for the ICS.

STEP 6: EFFLUENT LIMITS SETTING

Effluent limits were developed using the treatment data from the BAT Report[8] and from ICS plants with BAT treatment following the general procedures outlined in the Issue Resolution Committee reports on Monitoring Data Analysis, Limit Setting and Form of Limits.

Specific parameter limits were based on BAT performance data consisting of long term average loading values and appropriate variability factors to produce daily and monthly average limits equivalent to ninety-nine (P99) and ninety-five (P95) percentile values, respectively.

The Effluent Limits Regulation[9] for the ICS specifies all of the legal discharge requirements for each of the ICS plants. The Regulation requires compliance with discharge loading limits, lethality limits and requirements for flow measurement and reporting.

The Effluent Limits Regulation will be promulgated under Section 136 of the Ontario Environmental Protection Act and will require ICS plants to achieve regulatory compliance within three years of the promulgation date of the regulation. This will allow ICS plants sufficient time to implement the necessary pollution prevention and control strategies and to install the necessary capital equipment.

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CHAPTER 2

THE INORGANIC CHEMICAL SECTOR (ICS)

DEVELOPMENT DOCUMENT FOR THE INORGANIC CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

2.0 INTRODUCTION

This chapter includes a brief introductory description of inorganic chemical manufacturing and the types of wastewaters generated. Also included is an overview of production processes, water use and wastewater treatment at each of the Ontario ICS plants.

2.1 INORGANIC CHEMICAL MANUFACTURING

In the early days of development, chemistry was divided into fields of organic chemistry which was concerned with living organisms, and inorganic chemistry which covered all other substances. Inorganic chemistry today remains a major branch of chemistry that is re-defined to embrace most substances except those containing carbon chains.

The inorganic chemical industry processes and refines naturally occurring inorganic raw materials into a wide variety of products such as acids, bases, fertilizers, explosives, carbon black, detergent additives, bleaches and industrial gases. These materials themselves are used in the production of other finished products such as dyes, plastics and drugs. Process operations which are commonly used in the industry include purification, particle size reduction, drying, evaporation, melting, absorption and electrolytic reactions.

The majority of raw materials used in the inorganic chemical industry are naturally occurring substances and are generally extracted from the earth's crust. For instance, common table salt is a raw material for such chemicals as chlorine, caustic soda and sodium chlorate. These chemicals, in turn, are important ingredients for the production of wood pulp, plastics, bleaches, glass, detergents and aluminum.

Gypsum rock when calcined loses its water and is used to make plaster board while bauxite, which is approximately 80% aluminum oxide, is the primary ingredient for abrasive grains. The fertilizer industry uses air and natural gas as raw materials in the manufacture of nitrogen fertilizer products. Brine solutions pumped from wells and quarried limestone are the main components used for manufacturing products such as soda ash, calcium chloride, caustic soda and chlorine gas.

Wastewater generated from inorganic chemical manufacturing facilities typically contains conventional and toxic contaminants by virtue of the nature of the products manufactured. Conventional contaminants include suspended solids, acids, bases, chlorides, sulphates, phosphorus, oil and grease and nitrogen compounds. Toxic contaminants include cyanide, heavy metals and a number of organic contaminants. Organic contaminants are usually associated with cleaning solvents and degreasers from plant maintenance operations and on-site laboratories.

Physical-chemical treatment systems, flow equalization, neutralization, sedimentation, filtration, flocculation, ion-exchange and steam stripping are used in the industry to control the discharge of pollutants to surface watercourses. The use of biological systems for carbon removal from wastewater is not practical for this industry due to the relatively low levels of organic contaminants found.

2.2 PROFILE OF THE INORGANIC CHEMICAL SECTOR (ICS) IN ONTARIO

For the purposes of the Limits Regulation, the ICS is defined to include all direct discharging plants, primarily engaged in the processing, manufacturing, packaging or blending of inorganic chemicals. Inactive inorganic chemical sites which continue to have direct point source discharges to surface watercourses are also included.

The ICS in Ontario is diverse in terms of plant size and products manufactured. It consists of twenty-five plants of which eight are located in south-western Ontario, nine in the Niagara peninsula, five in eastern Ontario, two in the north-east part of the province and one in central Ontario. The plants each employ from six to five hundred people and range from small single product facilities such as abrasives, carbon dioxide, sulphuric acid, explosives and carbon black plants to large multi-product facilities such as fertilizer plants. Figure 1 shows the location of the ICS plants.

Physical-chemical treatment processes as well as in-plant water management measures are currently used in the Sector to reduce contaminant loadings to receiving waters. Currently, some plants do not provide treatment while others provide varying levels of treatment.

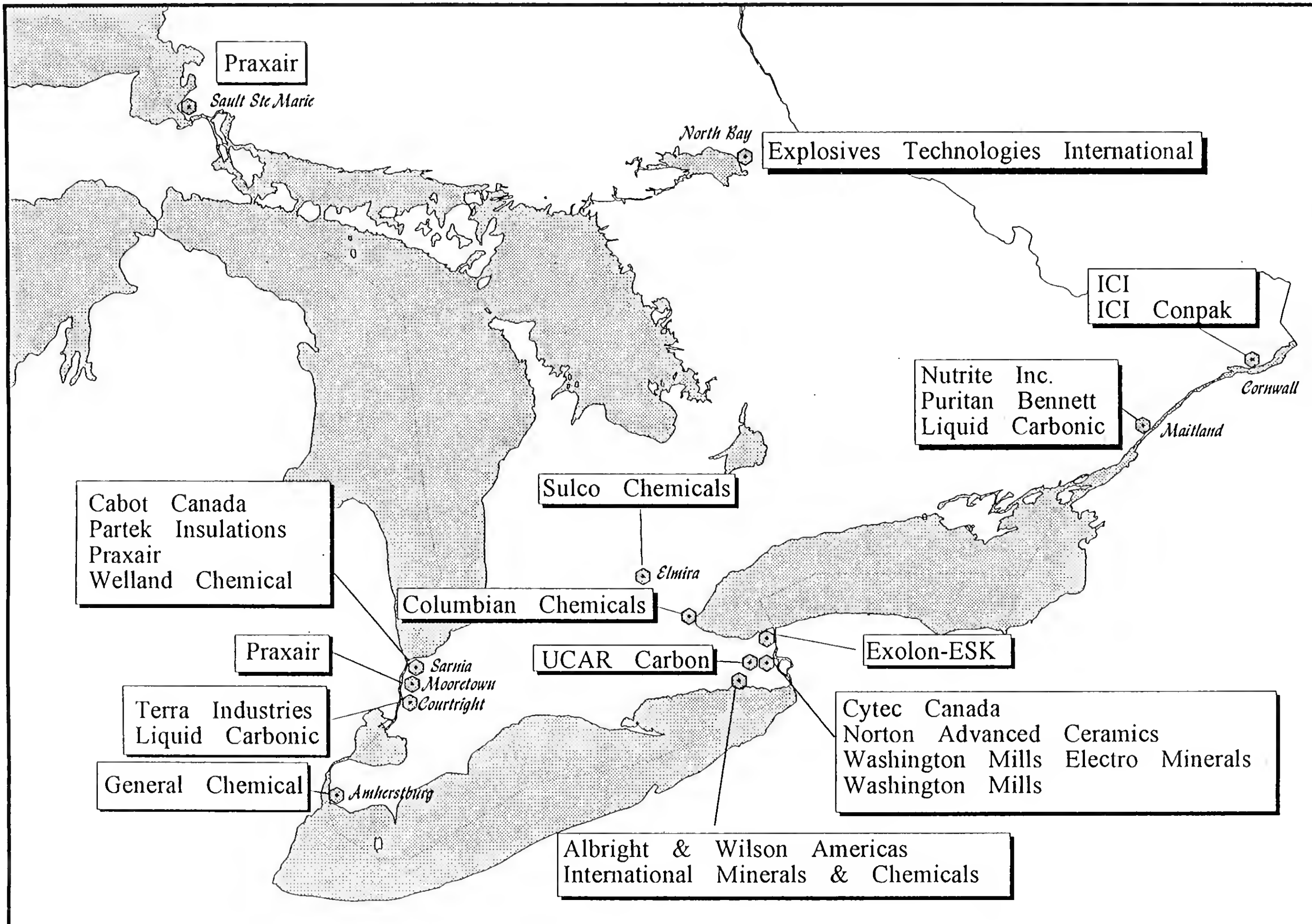
Four ICS plants are not included in the Effluent Limits Regulation although they were subject to the Effluent Monitoring Regulation. Table 2.1 lists the plants and the reasons why they were eliminated. These plants are excluded from any further discussion in this development document.

Table 2.1
ICS Plants Excluded From The Effluent Limits Regulation

Plant	Location	Reason for Exclusion
Allied Chemicals Canada	Amherstburg	Mothballed in August, 1992
Canadian Liquid Air	Courtright	Shutdown in November, 1989
Cyanamid Canada Inc	Niagara Falls	Shutdown in April, 1992
Fiberglas Canada Inc	Sarnia	Shutdown in May, 1990

On July 14, 1994, ICI Canada Inc., issued a news release announcing the closing of the chlor-alkali unit at its Cornwall plant site by the end of October 1994.

Figure 2.1: Inorganic Chemical Sector Plant Locations



2.3 SECTOR OVERVIEW OF PRODUCTION PROCESSES, WATER USE AND WASTEWATER TREATMENT

This Section provides an overview of the ICS plants summarizing details such as types of processes used at each facility, number of employees, water use and wastewater treatment. Further details on ICS plants are provided in the Ontario ICS BAT Study Report[1]

Albright and Wilson Americas - Port Maitland.

The Albright and Wilson plant is located in Port Maitland at the mouth of the Grand River on Lake Erie. The plant employs approximately seventy people in the manufacture of phosphoric acid and various sodium and potassium phosphates.

Sodium based phosphates are used as water softeners in detergents. Potassium based phosphates are used as inhibitors in automotive engine coolants, as additives in coffee creamers and in liquid detergents.

Phosphoric acid is produced by burning yellow phosphorus in air and then adding water to the oxide to give the required product acid concentration. This acid is then reacted with sodium and potassium salts to produce the various industrial phosphate products.

Water Use and Wastewater Treatment

The site discharges approximately 6000 cubic metres per day of effluent into the Grand River via the Welland feeder canal.

The final effluent is made up mostly of once-through cooling water, with some additions from ion-exchanger backwashes and water softener columns. Once-through cooling water is used for non-contact cooling of phosphoric acid and liquid potassium phosphate products. A cooling tower is used to cool water from the furnace burner, hydrator and venturi jackets. Process wastewater generated in the manufacturing operation is stored in a lagoon for process recycle.

Cabot Canada Ltd - Sarnia.

The Cabot Canada facility is located in Sarnia and employs approximately 180 people. It manufactures carbon black by the oil furnace process. Carbon black is used in the manufacture of automotive tires, inks, paint pigments and carbon paper.

Aromatic tars are heated in the presence of air in a refractory lined furnace where they are cracked at approximately 1,600 degrees Celsius into carbon and a waste gas stream of hydrogen, carbon monoxide and carbon dioxide. The carbon is recovered as a powdered product while the hydrogen is used as a source of energy for the waste heat boilers.

Water Use and Wastewater Treatment

Intake water is supplied from nearby Polysar Limited. Water is used in the process as a quench to control the temperature after the cracking reaction and is also added in the pelletizing process.

All storm water that accumulates on site is collected and treated with alum to precipitate suspended solids in a settling lagoon. Wastewater is then passed through sand filter beds before final discharge to Talford Creek at a daily rate of approximately 2200 cubic metres. The lagoon also collects water from boiler blowdowns, air conditioning units and wash water. A second lagoon is used as stand-by.

Columbian Chemicals Ltd.

The plant is located in Hamilton near the Burlington Skyway. It employs about 120 people in the manufacture of carbon black using the furnace process.

The furnace feedstock consisting of petroleum hydrocarbon, coal tar distillate and small amounts of caustic potash is cracked at about 1,600 degrees Celsius. The products are carbon black and a gas stream of hydrogen, carbon monoxide and carbon dioxide. The carbon black is cooled using quench water and sent to a classifier. Baghouses separate the product from the gas stream. Hydrogen is recovered as a source of energy for the boilers and dryers.

Water Use and Wastewater Treatment

Intake water comes from Hamilton Harbour and from the City of Hamilton municipal supply. The water is used as non-contact cooling water, quench water, bead water or for steam.

Process, cooling and production area storm water is collected in sumps and reused as quench spray. Boiler water treatment residuals and boiler blowdown are discharged to the municipal sanitary sewer. The only discharges off the site are storm water flows from outside of the production areas.

Cytec Canada Inc. (formerly Cyanamid Canada Inc). - Welland plant.

The name of the Welland plant was changed from Cyanamid to Cytec in 1993. It is located on the south side of Niagara Falls on the Welland River. It presently employs approximately 85 people in the manufacture of phosphine and phosphine derivatives. The Welland plant has one final effluent discharging 7000 cubic metres per day into Miller's Creek which in turn flows into the Welland River.

A small on-site operation also manufactures electronic grade chemicals, however, there is no effluent discharged from the unit. Phosphine gas is produced by reacting yellow phosphorus with steam in a reactor. Other derivatives are also produced from the phosphine gas.

Dicyandiamide and cyanamide solution manufacturing operations were shutdown in 1992. Prior to May 1987, the plant manufactured nitric acid, ammonium nitrate, urea and calcium phosphate. Ammonia was also produced prior to May 1990. These products are no longer manufactured.

Water Use and Wastewater Treatment.

Intake water is supplied from the Welland River. Wastewaters are generated from boiler blowdowns. Wastewater also originates from once-through cooling water streams and a sludge pond. All process units discharge into Miller's Creek which runs through the Cyanamid property. There is a sludge pond on site which receives waste sludge material from the phosphine plant.

In the past, the final discharge from this facility was subject to sudden pH and specific conductance spikes. Cytec has since provided equalization of the effluent upstream of its final sampling location to reduce the impact of these surges on the final discharge.

The Exolon - ESK Company of Canada Ltd - Thorold.

The Exolon - ESK facility, located in Thorold, produces aluminum oxide, silicon carbide, and ferro-silicon for use in the manufacture of various types of abrasive tools. It employs approximately 100 people.

Aluminum oxide is manufactured by fusing bauxite ore with a small amount of coke in an electric-arc furnace. The melt is poured into ladles where it cools and solidifies. This solid material is then crushed to produce the final abrasive grains. Ferro-silicon, a by-product, is also recovered from the ladle bottoms.

Silicon carbide is manufactured by reacting sand and coke, at 2,000 degrees Celsius, in a horizontal furnace.

Water Use and Wastewater Treatment

Intake water is obtained from the Welland River. The plant has one final effluent stream which discharges at a rate of 9600 cubic metres per day into Beaverdam pond and eventually to Lake Gibson.

Water is used to provide cooling for furnace shells, transformers, and ladles. All the cooling water is sent to a sedimentation pond before discharge to Beaverdam Pond. Storm water from the plant discharges with the final effluent.

E T I Explosives Technologies International - North Bay.

Explosives Technologies International is located in North Bay and employs approximately 185 people. The plant was sold by Du Pont Canada in 1988 to Canadian Investment Capital and now operates under the name of Explosives Technologies International.

The plant presently manufactures two types of explosives, ANFO (a mixture of ammonium nitrate and fuel oil) which is sold under the trade name of "Nilite", and water gel explosives. Until 1985, the facility, as part of Du Pont Canada, also produced ammonium nitrate and nitric acid.

Water Use and Wastewater Treatment

Intake water is supplied from Lake Nipissing. In the water gel process, water is used for making water gel solutions, equipment washdowns, reworking waste solutions and general housekeeping. Most of this water is recycled. However, a portion is purged and sent to a holding pond on site. In the summer the wastewater from the pond is sprayed on land adjacent to the pond. Water is used at the ANFO operation for wash-downs and is collected and sent to the holding pond.

The plant discharges its wastewater at a daily rate of approximately 900 cubic metres through one outfall into La Vase Lake. This wastewater consists of excess intake water from Lake Nipissing, once-through cooling water, boiler blowdown, surface run-off from the old ammonium nitrate/nitric acid plant areas and leachate from the irrigated sections of land. In addition, there are three storm ditches draining the property.

General Chemical Canada Ltd - Amherstburg.

General Chemical Canada Ltd. is located beside the Detroit River just outside the town of Amherstburg. It employs approximately 500 people and manufactures soda ash and calcium chloride. Allied Chemicals Canada Inc. manufactured Genetrons™ (chlorofluorocarbons) and hydrogen fluoride at the same complex until April 1992. General Chemical Canada has two outfalls which discharge into the Detroit River, the North Drain and the Main Drain.

Soda ash is used as a major raw material in the manufacture of sodium salts, glass, detergents, and for pH control. Principal uses of calcium chloride include dust control and maintenance of secondary roads, freeze conditioning for coal and ores, as a conditioner for concrete and as a dehydrating agent.

Soda ash is produced by the Solvay process. Ammoniated brine solution is carbonated and then heated to form sodium carbonate product and by-product calcium chloride. The calcium chloride solution containing sodium chloride, lime, inert solids and ammonia is pumped to the calcium chloride plant where it is clarified and concentrated to produce a final product. Excess liquid and inert solids are sent to the soda ash settling basin.

Water Use and Wastewater Treatment

Intake water is pumped from the Detroit River. Wastewater generated from the soda ash plant is sent for processing to the calcium chloride plant. After calcium chloride recovery, the wastewater is pumped to the soda ash basin for settling of solid material.

™ Genetron is a registered trade mark of Allied Chemicals Canada Inc. for its chlorofluorocarbon product

Effluent from the soda ash basin is discharged at the rate of 15,000 cubic metres per day via the North Drain to the Detroit River. Waste streams from the lime kilns, boiler blowdowns and barometric condensers are sent to the Main Drain which discharges at a daily rate of approximately 200,000 cubic metres.

A consultant study by Woodard and Curran[2] was undertaken in October 1993 on behalf of the Ministry and General Chemical to look at in-process changes or the use of Main Drain dilution to render the North Drain effluent non-toxic. The study found no economically achievable method of ensuring ongoing compliance with the toxicity requirements of the limits regulation for the North Drain.

ICI Canada Inc. - Cornwall.

The ICI chlor-alkali plant, which dates back to 1935, is located in Cornwall and employs approximately 160 people. It shares the same manufacturing complex with Cornwall Chemicals Ltd., a producer of carbon tetrachloride and carbon disulphide.

The chlor-alkali plant produces caustic soda, caustic potash, chlorine, hydrogen, hydrochloric acid, chlorinated paraffins and sodium hypochlorite. These are used in the manufacture of various products including PVC plastics, bleaches and in the treatment of wood pulp.

Chlorine and caustic soda are produced from the electrolytic decomposition of brine solution in a mercury cell where the mercury forms the cell cathode and a parallel steel mesh, the anode. An electric current is passed through a flowing brine solution liberating chlorine at the anode and sodium metal at the mercury cathode. The sodium-mercury amalgam flows to a decomposer where water is added to react with the sodium to form sodium hydroxide and hydrogen gas. Potassium hydroxide is also manufactured when potassium chloride is used in place of the brine solution.

Hydrochloric acid is produced by the combustion of chlorine and hydrogen, a by-product from the manufacture of caustic soda. The acid vapour is absorbed in water to form the final product.

On June 14, 1994 the Company announced that the the Chlor-alkali operation will be shutdown at the end of October 1994. The site will continue to produce sodium hypochlorite and chlorinated paraffins.

Water Use and Wastewater Treatment

Intake water for the ICI site is largely supplied by the city of Cornwall. However during the summer, well water is used to supplement the city water supply. Principal water uses include make-up for the brine circuit, dilution for caustic solutions, seal water in brine pumps, cooling tower make-up, as an absorber for hydrogen chloride gas to make acid, cell room and general equipment wash water.

Wastewater from the cell-room is treated with ferrous sulphate and sodium hydrosulphide to precipitate mercury. It is adjusted for pH and filtered before mixing with water from other areas of the plant. The combined effluent from the chlor-alkali complex discharges into the Brookdale Ave. sewer at a rate of approximately 4,000 cubic metres per day.

ICI Canada Inc. (Conpak) - Cornwall.

Stanchem, a Business Unit of ICI Canada Inc., operates a filling and packaging facility in Cornwall. The site, employing forty people, is adjacent to the Cornwall Chemical Ltd. manufacturing facility. It packages a number of products such as liquid chlorine, sulphur dioxide, anhydrous ammonia, hydrochloric acid and sulphuric acid.

Water Use and Wastewater Treatment

Wastewater from the facility is generated from container and floor washings. All washings drain to a central collection sump for neutralization. The effluent is batch discharged into the Brookdale Ave. sewer at a daily rate of approximately 30 cubic metres.

International Minerals and Chemicals Corporation (Canada) Ltd - Port Maitland.

The International Minerals and Chemicals plant is situated in Port Maitland, along the Grand River at Lake Erie. Presently employing only twelve people, this site has been shutdown since 1984, and is now being used as a warehouse facility for imported phosphate fertilizers and animal feed phosphates. It has one effluent discharging into the Grand River.

The plant manufactured phosphoric and sulphuric acid, calcium phosphate, and various grades of super phosphate fertilizer. Sulphuric acid was reacted with phosphate rock to produce phosphoric acid and super phosphate fertilizers. To produce calcium phosphate, limestone was reacted with phosphoric acid.

Water Use and Wastewater Treatment

There are presently five large storage ponds covering approximately 113 hectares, which contain gypsum material from the old phosphoric acid production process. These ponds are presently being drained. The pond water is neutralized with slaked lime before being discharged to the Grand River at a rate of approximately 2,700 cubic metres per day. Two of the ponds have been drained and covered with clay and grass. The remaining three ponds will be drained over the coming years. All storm water drains to the main sewer, where it is discharged through the plants main outfall.

Liquid Carbonic Inc. - Courtright.

The Courtright site of Liquid Carbonic Inc. employs twelve people. It is adjacent to the Terra Industries ammonia facility which provides by-product carbon dioxide feed for processing.

The carbon dioxide gas is compressed, cooled and liquified for storage. Some of the liquified carbon dioxide is used to produce dry ice.

Water Use and Wastewater Treatment

Intake water is received from the St. Clair River. Wastewater is discharged to the St. Clair River at a rate of approximately 4,900 cubic meters per day and is largely made up of once-through cooling water and some process condensate.

Liquid Carbonic Inc. - Maitland

The plant is located east of the village of Maitland. It employs 10 people in the production of liquid carbon dioxide and dry ice.

Carbon dioxide is the staring raw material. The gas goes through a series of compression and cooling steps to produce liquid carbon dioxide. Some of the liquid carbon dioxide is cooled and compressed to produce dry ice.

Water Use and Wastewater Treatment

An onsite well supplies about 2200 cubic metres of water per day for non-contact cooling, gas scrubbing. A portion of the water is softened for use as cooling tower make-up.

All compressor condensate, once-through non-contact cooling water, cooling tower blowdown and any plant floor drainage is routed to an oil separator prior to discharge to the St. Lawrence River.

Norton Advanced Ceramics of Canada Inc. - Niagara Falls

The Norton facility is located on the south side of the city of Niagara Falls, and employs approximately 255 people. The site manufactures various types of abrasive grains including light Alundum™, dark Alundum, and alumina-zirconia. Chromic oxide is also produced at this site, but on an infrequent basis.

Dark Alundum is produced by fusing bauxite, coke, and iron borings in an electric arc furnace. Molten products are poured into moulds for cooling. The solid Alundum is then crushed and ground before shipment as a granular product.

™ Alundum is a registered trade mark of Norton Canada Inc. for its aluminum oxide abrasive product

Light Alundum, which is a higher grade product, has sulphur added during the reduction process and is formed into ingots and crushed. The grains are acid slaked and washed with water to remove iron impurities, dried and magnetically separated.

In a separate process, calcined alumina is received on site and fused in a furnace. The melt is formed into ingots from which it is broken and crushed before shipment as a more refined product (99.8% alumina). Alumina-zirconia is manufactured by fusing together calcined alumina, zirconia, coke, and recycled fines. The melt is solidified and crushed to produce a very tough abrasive grain material.

Chromic oxide is infrequently produced in batch units at this site. Tri-valent chromium oxide is melted and formed into ingots to produce a purer product which is then shipped after particle size reduction.

Water Use and Wastewater Treatment

Intake water for the site is pumped from the Welland River. Wastewater is generated from cooling water for furnace shells, power transformers, and cooling of moulds. Wash water from the light Alundum process is neutralized with lime and sent to a 4.5 million gallon settling lagoon for solids removal. Discharge from this lagoon is then pumped into a sewer for final discharge to Pell Creek. Of three final discharge points, two discharge into Pell Creek while the third flows directly to the Welland River. The approximate total discharge for the plant site is 8600 cubic metres per day.

Nutrite Inc. (formerly Nitrochem) - Maitland.

The name of the Nitrochem plant was changed to Nutrite in 1993. The plant is located east of the village of Maitland along the St. Lawrence River. It employs approximately 175 people in the manufacture of nitric acid, ammonium nitrate and "nitrogen solutions".

Nitric acid has many uses as a common acid throughout industry. Ammonium nitrate is used largely as a fertilizer and is the main ingredient in most common explosives.

As of November 1992, ammonia manufacture was shutdown at the site. Ammonia is now brought in by rail car. The plant produces nitric acid from the oxidation of ammonia in air over a heated metal catalyst. The resulting oxides are absorbed in water to form the acid. Ammonium nitrate is formed when ammonia and nitric acid are mixed in a neutralizer to form approximately 80% ammonium nitrate solution.

Water Use and Wastewater Treatment

Intake water, pumped from the St. Lawrence River, is used in the nitric acid absorption units, in the manufacture of nitrogen solutions and as make-up water for boilers and fire water systems.

All regular process wastewaters from the boiler, compressor and cooling tower blowdowns, laboratory drains and water treatment regenerants are discharged to the St. Lawrence River at a rate of approximately 800 cubic metres per day.

Nitrogen-containing process wastewater generated from the nitric acid and ammonium nitrate plants, and surface runoff from these areas flow to the equalization pond. From there the nitrogen-containing solution is pumped to an "Aquachem Unit" where it is concentrated for use as a product "nitrogen solution". The sanitary sewer effluent sewer is treated and joins regular process wastewater before the final discharge to the river.

Partek Insulations Ltd. - Sarnia.

Partek Insulations, located in Sarnia, employs approximately 130 people. It manufactures fibre insulation materials for use as roof and pipe insulation, insulating block boards and blankets, and loose wool and marine insulation.

Fibre insulation is manufactured when basaltic rock is mixed with coke and melted at approximately 1,400 degrees Celsius in a furnace. The molten charge is then formed into fibres and cooled. Various chemical agents are added to the fibre to impart specific physical qualities, such as greater structural rigidity and dust suppression abilities. The fibres are sent to a blow-chamber where they are drawn to produce wool blankets of various thickness. Batt and industrial felt products are then cut from these blankets. Loose wool products are also manufactured.

Water Use and Wastewater Treatment

Intake water is supplied from the city of Sarnia. Wastewater generated from floor washings, product over-spray and furnace cooling water blowdown is sent to a retention pond for recycle back into the process. Once-through cooling water is used for bearing cooling and is discharged to the Scott Road ditch at a daily rate of approximately 20 cubic metres. A number of raw materials such as coke, basalt rock and slag are stored in an open area, and are a potential source of storm water contamination.

Praxair Canada Inc. - Moore Township, Sarnia and Sault Ste. Marie.

Praxair Canada Inc (formerly Linde, Union Carbide Canada) operates three nitrogen producing gas plants located in Moore Township, Sarnia and Sault Ste. Marie. The sites are relatively small employing approximately twelve people, except for the Moore Township location which has minimal staffing.

The process initially consists of separating air into its constituent components. Nitrogen gas is extracted from the air separation process while the remaining gaseous components of air are vented to atmosphere except for the Sault Ste. Marie plant which in addition recovers the argon and oxygen. The gaseous nitrogen may either be fed directly by pipeline to nearby customers or may be liquified on site for storage.

Water Use and Wastewater Treatment

Intake water is supplied from the municipality for all three sites. The wastewater discharged originates from cooling tower blowdowns and storm water and is discharged at approximate daily rates of 12, 160 and 250 cubic metres for the Moore Township, Sarnia and Sault Ste. Marie sites respectively.

These are no on-site wastewater treatment facilities at the three facilities.

Puritan Bennett - Maitland.

Puritan Bennett is a producer of nitrous oxide. The site emoploying six people, is located adjacent to Nutrite Inc., a supplier of ammonium nitrate, a basic raw material for nitrous oxide. Nitrous oxide is made by the heating of ammonium nitrate in a reactor. The gas is then purified, compressed and liquified.

Water Use and Wastewater Treatment

Intake water is drawn from an on-site well and is used largely as once-through non-contact cooling water. Wastewater generated from the process is sent to the Nutrite plant for treatment and recycle. The site discharges approximately 270 cubic meters per day of cooling water.

Sulco Chemicals Ltd. - Elmira.

Sulco Chemicals in Elmira employs approximately twenty people. The plant manufactures sulphuric acid and packages a number of acids including hydrochloric, phosphoric, sulphuric and hydrofluoric.

Sulphuric acid is manufactured by burning molten sulphur at approximately 925 degrees Celsius in the presence of air. Sulphur dioxide is converted to sulphur trioxide after which it is sent to a combination of absorption towers for absorption in either 37% oleum or 99% sulphuric acid, depending on the required product type. Dilution of final acid with water achieves the desired acid concentrations.

Water Use and Wastewater Treatment

Intake water is supplied from the Town of Elmira. Wastewater generated from within the plant is sent to a 230,000 cubic metre settling pond before final discharge. Boiler blowdown, regenerant backwash and cooling tower blowdown in addition to storm water run-off are sources of wastewater that drain to the settling pond. The pond discharges at a rate of approximately 70 cubic metres per day into the Canagagigue Creek, a tributary of the Grand River.

Terra Industries (Canada) Inc.- Courtright.

Terra Industries Lambton Works (formerly ICI Canada's Lambton Works) is located south of the town of Courtright adjacent to the St. Clair River and employs 275 people. It is one of the largest fertilizer facilities in Canada manufacturing ammonia, granular urea, urea solution, sulphur coated urea, ammonium nitrate, nitric acid, nitrogen solutions and carbon dioxide. Prior to 1986, the facility under ICI Canada, also produced phosphoric acid and ammonium phosphate.

Ammonia is produced by the reaction of hydrogen gas with nitrogen over a catalyst at elevated temperatures and pressures. Natural gas is reformed at high temperatures to supply hydrogen, while nitrogen is supplied from the air. Carbon dioxide is formed as a by-product.

Urea is manufactured by the reaction of ammonia with carbon dioxide to form ammonium carbamate, which is then dehydrated to give a final urea product solution. Solid urea is formed by subjecting this urea solution to granulation or prilling operations. Some of the urea is then coated with liquid sulphur to be sold as sulphur coated urea.

Nitric acid is produced by reacting ammonia with air over a catalyst at high temperature to form nitrogen dioxide, which is then absorbed in water to produce nitric acid. Ammonium nitrate is manufactured by neutralizing ammonia with nitric acid to form ammonium nitrate solution. This solution is then "prilled" to form solid grains or prills of ammonium nitrate.

Water Use and Wastewater Treatment

Intake water is pumped from the St. Clair River. Process condensate from the ammonia plant is steam stripped to recover ammonia.

Once-through cooling water streams from the ammonia, urea, nitrogen solutions, ammonium nitrate, and nitric acid plants, are combined with the process streams before final discharge to the St. Clair River. Compressor and boiler blowdowns are discharged into the cooling water streams. Condensate from the ammonium nitrate neutralizer, floor washings, and other wastewater from the ammonium nitrate prill area is used to make nitrogen fertilizer solutions.

Process wastewater, once-through cooling water, and surface runoff discharge to a network of open and closed sewers, and ditches which are combined to give a single final effluent discharge into the St. Clair River at a daily rate of approximately 171,000 cubic metres.

The phospho-gypsum facilities at the Lambton Works are still owned by ICI Canada Inc. Prior to 1986, process water from the phosphate unit was sent to two large lagoons for solids settling (mostly gypsum) and cooling before being recycled. As the phosphate operation is presently shutdown, approximately 1.3 million cubic metres of pondwater is being stored in these lagoons. The water contains fluorides, ammonia, phosphates and low levels of dinitrotoluene.

UCAR Carbon Canada Inc. - Welland.

UCAR Carbon employs approximately 450 people at its location on the Old Welland Ship Canal. It manufactures graphite and carbon electrodes and cathode blocks.

Carbon electrodes are manufactured by mixing calcined anthracite coal with coal tar pitch and stearic acid. The mix is cooled to a suitable temperature for extrusion to carbon blocks. These blocks are baked at a temperature of approximately 1,000 degrees Celsius for conversion of the pitch binder to coke.

Graphite electrodes are similarly produced except that petroleum coke is used instead of anthracite coal. An additional processing step is included for producing graphite electrodes, where the carbon electrode is impregnated with petroleum pitch and heated to 3,000 degrees Celsius to convert the amorphous carbon to graphite.

Carbon electrodes are used in alloy furnaces. Graphite electrodes are used in electric arc furnaces while cathode blocks are used in aluminum smelters.

Water Use and Wastewater Treatment

Intake water to the site is pumped from the Old Welland Ship Canal. Wastewater from the plant originates as cooling water for furnace heads, compressors and fan bearings.

Two direct wastewater discharges of approximately 200 and 6300 cubic metres per day are in the process of being eliminated through water-use reductions, operational changes and rerouting to the municipal sanitary sewer. A third outfall discharges once-through cooling water and storm water at a daily rate of approximately 600 cubic metres. A waste disposal site is located on the south side of the facility and contains solid carbonaceous material, coke, coal and slag. The site also receives waste sludge from a pulp and paper mill which is sprayed on plant property adjacent to the manufacturing operations.

Washington Mills Electro Minerals Corporation - Niagara Falls.

Washington Mills Electro Minerals Corporation (formerly Electro-Minerals Canada Inc.) is located on Stanley Avenue in Niagara Falls. The plant manufactures various grades of abrasive metallic rods and employs approximately 100 people. Products include brown alumina, pink alumina, alumina bubbles, ferro-silicon, fused mag-chrome and ferro-carbo briquettes.

All products are manufactured by similar processes and differ only in starting raw materials. Raw materials are weighed and fed into a furnace in definite proportions where they are fused together and poured into moulds for cooling.

The cooled solid material is then crushed, sorted and screened to yield the final product. Major raw materials include bauxite, coke, iron borings, white alumina, chromic oxide, ferro-silicon, magnesite and chrome ore.

Water Use and Wastewater Treatment

Intake water is pumped from the Welland River. Process water generated from within the plant is mostly contaminated cooling water from furnace heads and power transformers. Wastewater is sent to one of two lagoons. The major portion flows to the Queen Lagoon for solids reduction and oil and grease removal. Part of the wastewater from this lagoon is recirculated to the plant, while the rest is discharged into Pell Creek at an approximate rate of 8,000 cubic metres per day.

The Old Lagoon accepts wastewater from the west side of the plant and discharges into the Stanley Avenue sewer at an approximate daily rate of 10,000 cubic metres.

Storm water from the plant is discharged through several locations into the Stanley Ave. sewer and from one location to Pell Creek.

Washington Mills Limited - Niagara Falls.

Washington Mills Ltd., located in the south end of the City of Niagara Falls, employs approximately 35 people. The facility manufactures aluminum oxide abrasive grains, crude aluminum oxide and ferro-silicon.

Both aluminum products are manufactured in an electric-arc furnace where bauxite, coke and iron filings are fused together to give the aluminum oxide melt. The melt is poured into cooling pots for solidification, removed from the cooling pots and broken-down to form the final product.

Water Use and Wastewater Treatment

Intake water is supplied from the Welland River and is used for cooling the furnace shell and melt pots. The spent cooling water is collected in open channels where it flows to a cooling pond for solids settling and aeration. This water is partially recirculated into the process. A separate closed cooling water system is provided for cooling the furnace transformer and cables. Make-up water for this system is supplied from the city water supply.

The plant has one effluent discharge into Chippawa Creek which drains to the Welland River at a daily rate of approximately 2000 cubic metres.

Storm water from the plant is collected in catch basins and combined with the cooling pond discharge effluent before final discharge. Storm water is also discharged separately into Chippawa Creek at a location downstream of the process effluent location.

Welland Chemical Ltd. - Sarnia.

Welland Chemical Ltd., located on Scott Road in Sarnia, employs approximately 60 people. The plant manufacturers anhydrous aluminum chloride, sodium hypochlorite, and packages chlorine gas. A once-through cooling water stream discharges into Talford Creek.

Aluminum chloride is produced by melting aluminum ingots in a furnace and passing gaseous chlorine through the melt. The gaseous aluminum chloride is then condensed and crystallized on the condenser walls. The crystals are removed periodically for crushing, screening, and packaging.

Liquid chlorine is received in tank cars and re-packaged into 150 pound cylinders and one tonne containers. The cylinders and containers are degassed and steam cleaned on site before they are filled. Sodium hypochlorite solution is also produced by directing residual chlorine to caustic reactors to produce a 15% sodium hypochlorite solution which is packaged into small plastic containers for distribution.

Aluminum chloride is used as a catalyst in the petroleum, pharmaceutical and other related industries. Chlorine is used for disinfecting water, in the manufacture of chlorinated hydrocarbons, plastics, and other chemicals. Sodium hypochlorite is used as a bleach and disinfectant.

Water Use and Wastewater Treatment

Intake water is supplied from the city of Sarnia. Water is used to vaporize liquid chlorine, to washdown the chlorine packaging areas and in the sodium hypochlorite units. Once-through cooling water is used for compressor and condenser cooling.

There are two on-site wastewater lagoons. The first collection lagoon collects wastewater from settling tanks, and wash water from the packaging, bulk loading and shipping areas. Three settling tanks collect wastewater originating from equipment washdowns in the aluminum chloride operation and from storm water run-off.

A second lagoon is used for treating effluent from the collection lagoon before it is finally batch discharged into Talford Creek at rates of approximately 130 cubic metres per batch.

2.4 REFERENCES

1. Ontario Ministry of the Environment, "Performance and Cost Evaluation of Best Available Technology Options for the Ontario Inorganic Chemical Sector", October 1992, ISBN O-7778-0209-0, Queen's Printer.

2. Woodard and Curran Environmental Services, Portland Maine,"Discharge Improvement Study For General Chemical Canada Ltd.", May, 1994.

CHAPTER 3

THE EFFLUENT MONITORING DATABASE

DEVELOPMENT DOCUMENT FOR THE INORGANIC CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

3.0 INTRODUCTION

This Chapter describes the sources of information and databases used in the development of the Effluent Limits Regulation for the ICS.

3.1 PRE-REGULATION MONITORING PROGRAM

In order to generate a database for use as a basis for selecting parameters for the Effluent Monitoring Regulation, ICS plants in consultation with the Ministry, conducted a voluntary pre-regulation monitoring program for all process and batch effluent streams. Intake water was also monitored at the majority of the sites.

Monitoring generally consisted of four days of composite sampling for the full list of Effluent Monitoring Priority Pollutant List (EMPPL) compounds,[1,2] (excluding resin and fatty acids), and for a selected list of conventional parameters. The EMPPL is a list of toxic pollutants that have been detected or are potentially present in Ontario municipal and industrial effluents.

In addition to the target parameters on the EMPPL, open characterization for organic chemicals and inorganic elements was conducted. Mass spectrometry/gas chromatography and plasma techniques were used on at least two of the four sets of composite samples to identify additional parameters not on the EMPPL that may have been present in the effluent. The Ministry also took an audit sample at each plant during one of the four sampling days. Historical data, where available, was used to supplement the pre-regulation monitoring database.

3.2 THE ICS EFFLUENT MONITORING REGULATION

Effluent monitoring data for the ICS plants was collected as a regulatory requirement of the general Ontario Regulation 695/88 as amended by Ontario Regulation 533/89, and the sector-specific Ontario Regulation 395/89 and its amendment, Ontario Regulation 649/89.

Plant Sites Covered under the Monitoring Regulation

Twenty-two plants, included initially in the ICS, began regulatory monitoring on December 1, 1989 under Ontario Regulation 395/89. Seven industrial gas plants were added later for twelve months of monitoring as of February 1, 1990 under an amendment by Ontario Regulation 649/89.

One plant, Canadian Liquid Air, Courtright, was shutdown in 1989 before monitoring commenced, while a second site, Fiberglas Canada, Sarnia, ceased production half-way through the monitoring period in May, 1990. Table 3.1 provides a summary of ICS plants which were included in the Effluent Monitoring Regulation.

Table 3.1
Plants Included In The ICS Effluent Monitoring Regulation

Plant Name	Location
Albright and Wilson Americas	Port Maitland
Allied Chemicals Canada Inc.[1]	Amherstburg
Cabot Canada Ltd.	Sarnia
Canadian Liquid Air[2]	Courtright
Columbian Chemicals Ltd.	Hamilton
Cyanamid Canada Inc. (Niagara Plant)[3]	Niagara Falls
Cytec Canada Inc.(Cyanamid) - (Welland plant)	Niagara Falls
Explosives Technologies International	North Bay
The Exolon-ESK Company of Canada Ltd.	Thorold
Fiberglas Canada Inc.[4]	Sarnia
General Chemical Canada Ltd.	Amherstburg
ICI Canada Inc.(formerly C-I-L)	Cornwall
ICI Canada Inc.- Conpak (formerly Stanchem)	Cornwall
International Minerals and Chemicals Ltd.	Port Maitland
Liquid Carbonic Inc.	Courtright
Liquid Carbonic Inc.	Maitland
Nitrochem Inc.	Maitland
Norton Advanced Ceramics of Canada Inc.	Niagara Falls
Partek Insulations Ltd	Sarnia
Praxair Canada Inc. (formerly Linde)	Moore Township
Praxair Canada Inc. (formerly Linde)	Sarnia
Praxair Canada Inc. (formerly Linde)	Sault Ste. Marie
Puritan Bennett Corporation	Maitland
Sulco Chemicals Limited	Elmira
Terra Industries (Canada) Inc. (formerly CIL/ICI)	Courtright
UCAR Carbon Canada Inc.	Welland
Washington Mills Electro Minerals Corporation	Niagara Falls
Washington Mills Limited	Niagara Falls
Welland Chemical Limited	Sarnia

1 - Allied Chemical was mothballed in August/92.
2 - Canadian Liquid Air was shutdown before the monitoring period commenced on Dec.1/89.
3 - Cyanamid's Niagara plant was shutdown in May/92.
4 - Fiberglas Canada was shutdown in May/90.

Monitoring Regulation Requirements

Under the Monitoring Regulation, each ICS plant was required to monitor its process and combined effluent streams for the ICS characterization list of contaminants on at least a semi-annual basis. The characterization list contains one hundred and fifty-four contaminants of which sixteen are classified as conventional pollutants.

Selected parameters from the characterization list were required to be monitored on a more frequent basis including daily, thrice-weekly, weekly and monthly. Once-through cooling water was monitored monthly.

An open scan was also required as part of the characterization analysis to identify and approximately quantify additional organic and elemental contaminants present in the effluent stream and not listed on the EMPPL. If confirmed to be present, these additional contaminants will be subject to a hazard assessment for possible future additions to the EMPPL.

Intake water monitoring was not a regulatory requirement but seventeen of the twenty-eight sites provided some intake monitoring data.

Monthly acute toxicity testing of process type effluent streams using trout and Daphnia magna was a requirement of the Regulation. Once-through cooling water final effluent streams were required to be monitored for toxicity on a quarterly basis.

The Effluent Monitoring Regulation also specified field Quality Assurance/Quality Control (QA/QC) requirements for each site. Field duplicates, travelling blanks and travelling spiked blanks were required monthly or quarterly, depending on the specific parameter's monitoring frequency. To verify the quality of the monitoring data, the Ministry collected at least one inspection sample during the monitoring period at each site with process effluent streams.

The rationale used for parameter selection and monitoring frequency assignment is contained in the development document for the Effluent Monitoring Regulation for the ICS[3].

Database Size

Approximately 226,000 data points were collected during the twelve-month monitoring period for twenty-eight plants discharging process, combined, batch, once-through cooling water, storm water and waste disposal site effluent streams.

Approximately 36,000 of these data points were collected for field QA/QC, while 9,000 were generated from Ministry inspection sampling.

Results of the Twelve-Month Effluent Monitoring Program

Twenty-eight plants monitored their effluent streams for the twelve-month regulated monitoring period. The results of the monitoring program are presented in a separate report[4] which includes site-specific concentration/loading tables of "found" parameters and plots of selected conventional contaminants.

A total of 138 EMPPL parameters were specified for monitoring in the regulation of which 86 were found with mean concentrations at or above the Regulation Method Detection Limit (RMDL). The RMDL is the maximum allowable method detection limit for a laboratory providing data under the Regulation.

Within the Sector, the largest dischargers of conventional contaminants[†] include General Chemical Canada Ltd., (Amherstburg) and Terra Industries (Canada) Inc., (Courtright). These plants also have relatively high effluent discharge flowrates.

Aluminum, boron, strontium and zinc were commonly found across the Sector. Other metals were found in effluents at less than one quarter of the plant locations. Several of the metals were found in the intake water at comparable levels to the effluent streams. Aluminum is often present in suspended clay particles in raw water while boron is found naturally in water. Strontium, like calcium, is a naturally occurring constituent of hard water.

Many of the metals may originate as constituents of process materials, equipment corrosion and catalysts. Vanadium and antimony may be related to process catalysts at some sites while chromium (III), copper, nickel, lead, and zinc may be products of equipment corrosion. Hexavalent chromium was only found in effluents from two facilities.

Arsenic, antimony, and selenium were found in effluents at eight plants.

Organic contaminants made up the majority of the remaining EMPPL parameters that were found. The number of detections and the loading were both relatively low, in part because only one of the plants, Allied Chemical, manufactured organic chemicals. The plant has since been shutdown.

Polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs) were found in effluents from eleven plants at concentrations greater than the RMDL. The quantification is inconclusive for eight plants since the results are based on a small number of samples. PCDDs/PCDFs in the effluents at two plants were at comparable levels to those in the intake water.

Toxicity test results indicated that the majority of ICS plant effluents were not acutely lethal to rainbow trout and <u>Daphnia magna</u>. However, some acute lethalities to <u>Daphnia magna</u> were observed.

[†]Conventional contaminants include total suspended solids, dissolved organic carbon, oil and grease, ammonia and ammonium nitrogen, nitrate and nitrite nitrogen, Kjeldahl nitrogen and phosphorus.

The twelve-month toxicity results for the Sector are discussed in two separate six-month reports[5,6].

Ministry inspection chemical sample data, with few exceptions, were determined to be within the 99th percentile concentration value of the plant monitoring data values and therefore showed that there was no major systematic difference between the two data sets.

Results of QA/QC Analysis of the Monitoring Data

The QA/QC data assessment process confirmed that virtually all of the effluent monitoring data for the ICS plants are acceptable for use in the limit setting process.

The assessment identified a small number of "found" parameters which required further attention before being considered for limits. Detailed results of the QA/QC assessment are documented in a separate report[7].

3.3 REFERENCES

1. Ontario Ministry of the Environment, "The Effluent Monitoring Priority Pollutants List (1887)" ISBN 0-7729-2784-7, Queen's Printer.

2. Ontario Ministry of the Environment, "The Effluent Monitoring Priority Pollutants List - 1988 Update", March, 1989, ISBN 0-7729-5450-X, Queen's Printer.

3. Ontario Ministry of the Environment, "The Development Document for the Effluent Monitoring Regulation for the Inorganic Chemical Sector", July, 1989, ISBN 0-7729-5700-2, Queen's Printer for Ontario.

4. Ontario Ministry of the Environment, "Twelve-Month Monitoring Data Report, Inorganic Chemical Sector" September 1992, MISA Industrial Section, Water Resources Branch, ISBN 0-7778-0094-2, Queen's Printer.

5. Ontario Ministry of the Environment, "Acute Lethality Data for Ontario's Inorganic Chemical Sector Effluents Covering the Period from December 1989 to May 1990", November, 1992, Aquatic Toxicity Unit, Water Resources Branch, ISBN 0-7778-0165-5, Queen's Printer.

6. Ontario Ministry of the Environment, "Acute Lethality Data for Ontario's Inorganic Chemical Sector Covering the Period from June 1990 to November 1990", February, 1993, Aquatic Toxicity Unit, Water Resources Branch, Queen's Printer.

7. Ontario Ministry of the Environment, "Municipal-Industrial Strategy for Abatement (MISA), Report on the Assessment of the Quality Assurance and Quality Control Data for the Inorganic Chemical Sector", MISA Industrial Section, Water Resources Branch, February, 1993, Queen's Printer for Ontario.

CHAPTER 4

BEST AVAILABLE TECHNOLOGY

(ECONOMICALLY ACHIEVABLE)

DEVELOPMENT DOCUMENT FOR THE INORGANIC

CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

4.0 INTRODUCTION

The goal of the MISA program, as stated in the June 1986 MISA White Paper[1], is "...the virtual elimination of toxic contaminants in municipal and industrial discharges into Ontario's waterways". This goal is to be achieved in part through the application of Best Available Technology Economically Achievable (BATEA).

4.1 BEST AVAILABLE TECHNOLOGY (BAT)

In order to determine BAT for the ICS, a Ministry sub-committee of the MISA Joint Technical Committee was formed with representatives from Industry, Environment Canada and the Ministry. The BAT/Limit Setting sub-committee prepared terms of reference for a BAT study which would be used as a basis for developing effluent limits for the Sector.

The BAT study was divided into two separate phases -- a Global BAT Study and an Ontario BAT Study.

The objective of the Global BAT Study was to develop an inventory of best available pollution control technologies applicable to Ontario ICS plants, through a world-wide search. The study included the selection of technologies which could provide improvements in the effluent quality of ICS plants towards the MISA goal.

The objectives of the Ontario BAT Study were to obtain information on the current status of ICS plants with respect to proposed BAT treatment so that recommended BAT options from the Global BAT Study could be evaluated as to their applicability to the ICS plants. In addition, predicted performance and order of magnitude costs for the recommended BAT options were also to be provided for each Sector plant.

The Ministry invited tenders to be submitted for the proposed BAT studies in November 1990. The proposals were reviewed and evaluated by members of the BAT sub-committee. CH2M HILL Engineering Ltd. was awarded both contracts in January 1991.

During the studies, CH2M HILL provided updates to the Ministry on an on-going basis and made presentations to the BAT sub-committee on progress.

Draft reports were presented to the sub-committee members in November, 1991. After a number of subsequent revisions the two reports were accepted by the sub-committee and the Joint Technical Committee in April, 1992. The final reports were published in October, 1992.

4.2 SUMMARY OF GLOBAL AND ONTARIO BAT STUDIES

Global Study

The objective of the Global BAT Study was to develop an inventory of best available pollution control technologies applicable to the Ontario ICS plants through a search in Canada, the U.S.A., Europe and the Far East. Information was required on methods to significantly reduce pollutants by means of pollution prevention using alternative manufacturing processes, chemical substitution methods and/or water re-use and recycle options as well as end-of-pipe treatment technologies.

Information was also required on design specifications, operating conditions, as-found treatment performance including variability data, order of magnitude capital and operating costs for wastewater treatment, in-plant controls and best management practices.

A report was prepared which includes the study methodology and technical inventory that was used as a reference for projecting cost and performance of implementing BAT options at Ontario ICS plants[2].

Conclusions of the Global BAT Study

The following is a summary of the main conclusions provided in the Global BAT Study for the ICS plants.

Abrasives Plants

The global search did not find abrasives sister plants with more advanced wastewater treatment than those practised at the four ICS abrasives plants. The ICS abrasives plants employ both settling and recycling of process effluent which is used at similar plants in the United States. Recycling rates of approximately 70% were generally found to be practised by abrasives plants. There were no sister plants identified in Europe.

Carbon Black Plants

Carbon black plants in the U.S. are subject to a U.S. EPA regulatory requirements of zero discharge of process effluent streams. This requirement is already practised by one plant in Ontario - Columbian Chemicals which discharges storm water only.

The other carbon black facility in Ontario, Cabot Canada, treats all its plant effluent which includes storm water, equipment/process washdown water and non-process related effluent such as boiler blowdown. Treatment consists of oil separation, coagulation, settling and filtration.

Chlor - Alkali Plants

In Europe, mercury-specific ion exchange resins are used as primary treatment for mercury removal from cell room wastes. Only two facilities in the U.S. were identified which have this technology in place.

In addition, a pollution prevention opportunity was identified for ICI's chlor-alkali facility in Cornwall. The use of membrane cell technology in place of the current mercury cell process would result in the elimination of mercury in effluent originating from this operation.

However such a conversion would be capital intensive and would produce a product of different grade and quality. A sister plant was identified at Beauharnois, Quebec which was recently converted to the membrane cell process.

Soda Ash Plants

A global search of soda ash plants which employ Solvay manufacturing technology, found that most of these facilities are located in Europe. It also found that the Ontario facility, owned by General Chemical Canada Ltd., is the only remaining Solvay facility operating in the U.S. and Canada.

Most of the European Solvay facilities discharge to salt water bodies and consequently do not use more advanced removal technologies for dissolved solids, a major contaminant from this manufacturing process. General Chemical has indicated to the Ministry that they are in fact better than other Solvay plants world-wide since they recover for sale 60-70 percent of the calcium chloride from their effluent.

Nitrogen Fertilizer Plants

A global search of nitrogen fertilizer facilities found that in-plant wastewater management is the key to reducing contaminant levels in effluents. Techniques include good housekeeping, reduction/reuse of process water streams and control of contaminant sources such as spills and leaks.

In the U.S. and Canada, the collection of high strength process wastewater for reuse in manufacturing is a very common practice for reducing effluent contaminant loadings.

Remaining ICS Plants

An investigation of global sister plants for the remaining ICS plants for more advanced treatment technology did not result in any new technologies being identified which would result in further reductions of contaminants beyond those provided at Ontario facilities.

End-of-pipe technology was recommended where more advanced technologies were not identified at sister plants and further contaminant reductions were necessary. Background information and performance data on selected end-of-pipe treatment technologies that are applicable for achieving these reductions are provided in the Global BAT Report[2].

Ontario Study

The objectives of the Ontario BAT Study were to obtain information on the current status of the ICS plants with respect to proposed BAT treatment so that recommended BAT options from the Global study could be evaluated as to their applicability to the ICS plants. In addition, predicted performance and order of magnitude costs for the recommended BAT options were also required.

Five BAT options were evaluated for each ICS plant based on information collected in the Global BAT Study. The options were selected according to the following criteria:

BAT Option 1	A least cost BAT option that achieves non-lethality to fish and Daphnia magna.
BAT Option 2	A BAT option selected by the U.S. Environmental Protection Agency (EPA) for comparable facilities in the U.S.
BAT Option 3	A BAT option that uses the best technology currently in Ontario.
BAT Option 4	A BAT option that is predicted to provide the maximum overall removal of contaminants.
BAT Option 5	A BAT option consisting of any current technology or combination of current technologies which will advance the ICS plants the furthest toward virtual elimination and the ultimate goal of zero discharge of contaminants.

Conclusions of the Ontario BAT Study

All of the work done in determining the current status of Sector plants and the selection of potential BAT technology under each of the five BAT Options was published by the Ministry in a report in October 1992. The Performance and Cost Evaluation of BAT Options Report[3] contains the study methodology and the rationale for the selection of BAT technologies for each plant together with predicted treatment performance and costs.

4.3 BAT TECHNOLOGY OPTIONS FOR THE INORGANIC CHEMICAL SECTOR

BAT Option 1

The criterion for the selection of technologies for BAT Option 1 was the achievement of no acute lethality to rainbow trout and Daphnia magna in 100% effluent. Other toxic and sub-lethal effects were not considered for this purpose.

A minimum level of technology was recommended to produce non-lethal levels of target contaminants. The method did not allow for the identification of possible synergistic toxic effects of low level contaminants nor did it include technologies to mitigate these effects. Technologies were not recommended beyond the existing wastewater management system where the effluent was largely non-lethal. Technologies recommended for achieving non-lethal effluents in the ICS are listed in table 4.1.

Table 4.1
BAT Option 1 Technologies For ICS Plants To Achieve Non-Lethal Effluents

BAT Option 1 Technology	Plant
Alkaline Chlorination	Welland Chemical
Dechlorination	Albright & Wilson, Welland Chemical
Nitrification/Denitrification	ICI Conpak, Nutrite, Cytec, Welland Chemical, Puritan Bennett
Chemical Precipitation	ICI Conpak, Nutrite
Filtration	ICI Conpak
Steam Stripping	Nutrite
Neutralization	Cytec, Nutrite Welland Chemical
Total Evaporation	General Chemical

BAT Option 2

To identify BAT Option 2 requirements, existing technologies and current effluent quality for ICS plants were compared to similar inorganic chemical facilities regulated by the U.S. EPA. If the existing effluent quality at an ICS plant was within U.S. EPA limits, no additional treatment was recommended. More advanced treatment was only recommended if the plant did not meet U.S. EPA limits.

Technologies recommended under BAT Option 2 were not necessarily those on which U.S. BAT regulations were based. In some instances, less expensive and/or more appropriate technologies were recommended for a specific plant to meet U.S. EPA limits.

The structure of the Inorganic Chemical Sector in the U.S. is somewhat different to that in Ontario. In the U.S., inorganic chemical manufacturing regulations apply to plants that produce bulk inorganic chemicals. Facilities manufacturing products such as fertilizers, explosives and carbon black are regulated separately in distinct industrial categories.

Only five of the twenty-five ICS plants proposed for effluent limits in Ontario were found to have equivalent U.S. EPA regulations[4,5,6]. These plants include Terra Industries and Nutrite (nitrogen fertilizers), ICI Cornwall (chlor-alkali), International Minerals and Chemicals (IMC) (phosphate fertilizers) and Cabot Canada (carbon black).

No recommendations are included for Columbian Chemicals (carbon black) under the carbon black category for BAT option 2 since the plant already meets U.S. EPA requirements for total recycle of process effluent.

Technology recommendations for upgrading ICS plants to meet U.S. BAT limits are listed in Table 4.2.

Table 4.2
BAT Option 2 Technologies For ICS Plants To Achieve U.S. EPA BAT Limits

U.S. EPA Industrial Category	ICS Plants	BAT Option 2
Carbon Black	Cabot Canada	total recycle of process effluent
Nitrogen Fertilizers	Terra Industries (Canada) Inc.	elimination of barometric condenser and clay bin wash water
	Nutrite	steam stripping, neutralization and sedimentation
Chlor-Alkali	ICI Cornwall	settling of brine muds filter water
Phosphate Fertilizers	IMC	no additional treatment required

BAT Option 3

BAT Option 3 included technologies that represent the best demonstrated wastewater control for comparable facilities in Ontario. Due to the diversity that exists within the ICS, eleven of the ICS plants could not be meaningfully compared with other facilities within the Sector since they are one of a kind in terms of process and products manufactured. Two of the plants, Explosives Technologies and Partek Insulations discharge only cooling water. The eleven plants are listed in Table 4.3. Additional treatment under Option 3 was therefore not recommended for these plants.

The remaining plants were grouped by products manufactured and compared with respect to wastewater management. Where applicable, the best demonstrated technologies within a group were applied to other plants in that group.

Table 4.3
ICS Plants Not Compared Under BAT Option 3

Unique ICS Plants	
Albright & Wilson	IMC
Cabot Canada	Partek Insulations
Cytec Canada	Puritan Bennett
Explosives Technologies	UCAR Carbon
General Chemical	Welland Chemical
ICI (Cornwall)	

Table 4.4 lists ICS plants which could be grouped by a common product for the purposes of comparing wastewater controls.

The BAT consultant indicated that all four abrasives plants incorporate technologies that include settling and partial recycling of contact cooling water. Since effluent quality is comparable between the four plants and no advanced treatment is being used at any plant, there was no recommendation for additional treatment technology.

Similarly for the industrial gas plants, although systems vary slightly from plant to plant, generally all of them have equivalent technologies for wastewater management and no particular plant could be considered as representing the best within the group.

Although different technologies are used to produce nitrogen fertilizer products at Terra Industries and Nutrite, both plants incorporate collection and reuse of process wastewater. A direct comparison of effluent quality was not considered by the BAT consultant due to significant operational differences that exist between the two facilities. These include differences in manufacturing technology, product lines and capacities, cooling water use (non-contact cooling water at Terra Industries and recirculating cooling water at Nutrite) and effluent monitoring point locations.

Despite these differences, the BAT consultant concluded that the two plants are equivalent in terms of wastewater management and did not recommend additional technology for either plant under BAT Option 3.

Sulco Chemicals and ICI Conpak were grouped together since in addition to manufacturing and packaging activities at each site, they both package inorganic acids. Removal of TSS and improved control of pH was recommended for ICI's Conpak plant to bring it to similar performance levels as Sulco.

Table 4.4
ICS Plants Compared Under BAT Option 3

Category	ICS Plants	BAT Option 3
Abrasives	Exolon	No additional treatment
	Norton	
	Washington Mills	
	Washington Mills Electro Minerals	
Industrial Gas Plants	Liquid Carbonic (Courtright)	No additional treatment
	Liquid Carbonic (Maitland)	
	Praxair (Moore Township)	
	Praxair (Sarnia)	
	Praxair (Sault Ste. Marie)	
Nitrogen Fertilizer Plants	Nutrite	No additional treatment
	Terra Industries (Canada) Inc.	
Packaging Plants	ICI Conpak	Settling and neutralization for ICI Conpak
	Sulco Chemicals	

BAT Option 4 (a,b)

Technologies recommended under BAT Option 4 include a combination of demonstrated technologies identified in the Global study that would provide the maximum overall reduction of contaminants.

A pollution prevention approach was initially considered in the development of recommendations. Where practical pollution prevention measures were unavailable, in-plant controls and end-of-pipe treatment were recommended.

Maximum removal technologies for ICS plants under BAT Option 4a are listed in Table 4.5.

BAT Option 4b presents an alternative recommendation under the maximum removal option specifically for ICI's chlor-alkali plant at Cornwall. The plant manufactures caustic soda and chlorine using the mercury cell process. Ion-exchange technology for mercury removal was recommended as a first level of treatment under BAT Option 4a. Under BAT Option 4b, however, replacement of the existing mercury cell process with membrane cell technology is recommended to eliminate the use of mercury in the process.

Since the ICI plant is to be shutdown at the end of October 1994, both of the recommended ion-exchange and membrane cell technologies are no longer relevant.

Table 4.5
BAT Option 4a Technologies For ICS Plants
To Achieve Maximum Removal of Contaminants

BAT Option 4a Technologies	**Plants**
Alkaline chlorination	Welland Chemical, Cytec
Dechlorination	Albright & Wilson, Welland Chemical, Cytec
Nitrification/denitrification	ICI Conpak, Cytec, Nutrite, Puritan Bennett
Chemical precipitation	ICI Conpak, Nutrite
Settling	ICI Conpak, ICI Cornwall, Sulco
Filtration	ICI Conpak, Cytec, Nutrite, Sulco
Steam stripping	Nutrite, General Chemical
Neutralization	Cytec, Nutrite, Welland Chemical
Total evaporation	General Chemical, ICI Cornwall
Recycle of process effluent - 30% recycle rate - total recycle (for 1 of 3 process effluent streams)	ICI Conpak Norton
Surface condensers	General Chemical, Terra Industries
Ion-exchange for mercury removal	ICI Cornwall

BAT Option 5

BAT Option 5 considers technologies which will bring ICS plants the furthest towards the goal of virtual elimination of persistent toxic contaminants.

For the majority of ICS plants, the BAT consultant did not recommend additional technologies beyond those covered under BAT option 4. For purposes of developing a complete list of limit options however, the Ministry did estimate the costs of installing total evaporation for all ICS process effluent streams.

Conclusions

A summary of the complete list of BAT technologies and their associated capital and operating costs are presented in Table 4.6.

On the basis of economic analyses, BAT Option 4 was selected as the preferred economically achievable option on which limits were based.

The performance predicted for BAT Option 4 is shown in detail in Appendix B for each plant site. Long term average concentration and loading data reflecting operations during the twelve-month monitoring period for each plant are shown for comparison.

Table 4.6
Summary of Capital and Operating Costs for ICS BAT Options*

Plant BAT Options		Cap. Costs (000's $)	O&M Costs (000's $)/yr
Albright and Wilson Americas			
BAT 1(Non-toxic):	dc	163	11.3
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	dc	163	11
BAT 5(Virt.Elim):	te	19300	5400
Cabot Canada Ltd.			
BAT 1(Non-toxic):	n/a	n/a	n/a
BAT 2(U.S.):	n/c	50	-
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	50	n/a
BAT 5(Virt.Elim):	te	10,500	3,100
Cytec Canada Inc. (Welland Plant)			
BAT 1(Non-toxic):	nit/denit, pH adj.	2,363	30
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	nit/denit, fil., ac, dc, pH adj.,	2,363	30
BAT 5(Virt.Elim):	te	3,000	900
The Exolon-ESK Company of Canada Ltd.			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	n/a	n/a
BAT 5(Virt.Elim):	te	25,400	7,400
General Chemical Canada Ltd.			
BAT 1(Non-toxic):	te (CO0100)	27,000	233,000
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	te (CO0100), Surf.Cond.and steam stripping (C0200).	34,200	6,200
BAT 5(Virt.Elim):	te (CO0100 and 0200)	169,000	250,000
ICI Canada Inc. (Cornwall)			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	Settling	negligible	negligible
BAT 3(Ont):	n/c	n/c	n/c
BAT 4a(Max.Rem.):	Settling, ion-exch. (mercury), te.	920	negligible
BAT 4b(Max.Rem.):	Membrane cell technology	3,415	900
BAT 5(Virt.Elim):	te	2,500	1,000

Plant BAT Options		Cap. Costs (000's $)	O&M Costs (000's $)/yr
ICI Canada Inc. - Conpak			
BAT 1(Non-toxic):	Chem precip, fil, nit/denit	620	4
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	Chem.precip., fil	117	4
BAT 4(Max.Rem.):	Chem.precip., settling, fil, nit/denit, Recycle of proc. effl.,	645	10
	te (at ICI Cornwall)	800	200
BAT 5(Virt.Elim):	te		
International Minerals and Chemicals Ltd.			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/c	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	n/a	n/a
BAT 5(Virt.Elim):	te	12,300	3,600
Liquid Carbonic Inc.(Courtright)			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	n/a	n/a
BAT 5(Virt.Elim):	te	17,000	4,900
Liquid Carbonic Inc. (Maitland)			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	n/a	n/a
BAT 5(Virt.Elim):	te	7,600	2,200
Norton Canada Inc.			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	15	10
BAT 5(Virt.Elim):	te	23,800	6,900
Nutrite Inc.			
BAT 1(Non-toxic):	Steam stripping, neut., settling, nit	4,030	690
BAT 2(U.S.):	Steam stripping, neut., settling	1,110	610
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	Steam stripping, neut., settling, nit/denit, fil	6,630	790
BAT 5(Virt.Elim):	te	5,700	1,700
Praxair Canada Inc. (Moore Township)			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	n/a	n/a
BAT 5(Virt.Elim):	te	200	100

Plant BAT Options		Cap. Costs (000's $)	O&M Costs (000's $)/yr
Praxair Canada Inc. (Sarnia)			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	n/a	n/a
BAT 5(Virt.Elim):	te	600	200
Praxair Canada Inc. (Sault Ste. Marie)			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	n/a	n/a
BAT 5(Virt.Elim):	te	2,900	800
Puritan Bennett Corporation			
BAT 1(Non-toxic):	nit/denit	1,600	53
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/a	n/a	n/a
BAT 4(Max.Rem.):	nit/denit	1,600	53
BAT 5(Virt.Elim):	te	3,000	900
Sulco Chemicals Ltd.			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	Settling	34	undefined
BAT 5(Virt.Elim):	te	1,300	400
Terra Industries (Canada) Inc.			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	Surf. cond(CO 0500)	257	30
BAT 3(Ont.):	n/c	n/a	n/a
BAT 4(Max.Rem):	Surf. cond(CO 0500)	257	30
BAT 5(Virt.Elim):	te	95,800	27,600
UCAR Carbon Canada Inc.			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	n/c	n/a	n/a
BAT 5(Virt.Elim):	te	20,000	5,800
Washington Mills Ltd.			
BAT 1(Non-toxic):	n/c	n/a	n/a
BAT 2(U.S.):	n/a	n/a	n/a
BAT 3(Ont):	n/c	n/a	n/a
BAT 4(Max.Rem.):	Alternate water source	1,015	10
BAT 5(Virt.Elim):	te	10,100	3,000

Plant BAT Options			**Cap. Costs (000's $)**	**O&M Costs (000's $)/yr**
Washington Mills Electro Minerals Corporation				
BAT 1(Non-toxic):	n/c		n/a	n/a
BAT 2(U.S.):	n/a		n/a	n/a
BAT 3(Ont):	n/c		n/a	n/a
BAT 4(Max. Rem):	increased recycling of process stream		217	6
BAT 5(Virt.Elim):	te		32,200	13,120
Welland Chemical Limited				
BAT 1(Non-toxic):	Settling, pH adj., dc		575	negligible
BAT 2(U.S.):	n/a		n/a	n/a
BAT 3(Ont):	n/c		n/a	n/a
BAT 4(Max.Rem.):	Settling, pH adj.		575	negligible
BAT 5(Virt.Elim):	te		3,100	900
TOTALS** FOR SECTOR		BAT 1	9,351	788
		BAT 2	1,417	640
		BAT 3	117	4
		BAT 4	16,978	1,850
		BAT 5	297,100	90,120

* **Source of data - CH2M HILL Engineering BAT Report and plant provided updates**

No costs are shown for Columbian Chemicals Ltd., Explosives Technologies International and Partek Insulations Ltd., since these plants do not discharge process effluents

Costs for BAT Option 4 for ICI Canada Inc., at Cornwall do not include the membrane cell option

** **General Chemical Canada Ltd. costs are excluded in the Totals for the Sector**

Legend:

n/a	= not applicable
n/c	= no change
nit/denit	= nitrification/denitrification
ac	= alkaline chlorination
dc	= dechlorination
te	= total evaporation
fil	= filtration
pH adj.	= pH adjustment

4.4 ECONOMIC ASSESSMENT

To develop effluent limits based on BATEA, the Ministry conducted an economic assessment to determine the impact of imposing each of the five recommended BAT Options on the ICS. The objectives of the economic assessment were to:

- evaluate the cost-effectiveness of potential wastewater treatment and abatement options;
- show the incremental costs of successively higher levels of contaminant removal (i.e. lower levels of pollutant loadings in wastewater);
- assess the potential financial and economic consequences of the costs associated with potential abatement program BAT options;
- analyze the ability of industry to pass-on potential regulatory induced cost increases as product price increases or input price decreases;
- determine the effects of the potential regulatory-induced costs on the competitive position of the ICS plants.

The estimated costs of the BAT technologies identified in the BAT report and the contaminant removals associated with each technology train were used to derive least-cost abatement cost functions.

The abatement cost functions show the costs of applying different technologies to obtain higher levels of contaminant removal with the least-cost abatement cost function showing the lowest cost combination of technologies to achieve a given reduction in loadings. Based on predefined decision rules, up to five aggregate levels of abatement were defined for each plant.

A generic Sector approach was not adopted for the ICS because each of the plants within the Sector was considered to be largely unique in terms of processing and wastewater characteristics.

Costs for Each BAT Option

The costs associated with each of the BAT options for the ICS are reviewed in this section.

General Chemical Canada is excluded from the analysis to avoid biasing the financial ratios, since the estimated abatement costs for this plant are orders of magnitude greater than those for other plants in the Sector.

Tables 4.7 and 4.8 provide a summary of the projected capital costs and loading reductions for each of the recommended BAT Options.

BAT Option 1

For BAT Option 1 (non-lethal option), six plants are required to install technology to remove lethality in their effluent streams. Implementation of abatement technologies for these plants would cost $11.05 million (before tax) in capital and $0.85 million (before tax) in operating costs. These costs would represent an annualized after-tax expenditure of $1.7 million and would result in estimated effluent loading reductions of 1.0%.

BAT Option 2

BAT Option 2 (U.S. Option) covered only five ICS plants, since they were the only ones which have similar U.S. manufacturing facilities regulated by the U.S. Environmental Protection Agency. Implementation of the abatement technologies would cost $1.42 million (before tax) in capital costs and $0.64 (before tax) million in operating costs.

While this option is the most cost effective at $1.15 per kilogram of contaminants removed, it is not viable since it is applicable to only five plants, of which only four are required to install treatment.

BAT Option 3

BAT Option 3 (Ontario option), was not a viable option since only one plant was required to install additional treatment.

BAT Option 4

Under BAT Option 4 (maximum removal option), twelve plants would be required to reduce contaminant discharge loadings. Implementation would cost $19.04 million in capital costs (before tax) and $1.85 million in operating cost (before tax). These costs would represent an annualized after tax expenditure of $3.2 million. This option would result in removals of approximately 22% of the initial loadings at a cost of $1.49 per kilogram. Option 4 is the preferred option for the Sector based on the cost effectiveness of loading reductions.

BAT Option 5

For BAT Option 5 (virtual elimination), twenty-one plants would be required to install abatement technologies at a capital cost of $299 million (before tax) and operating costs of $90 million (before tax). The cost per kilogram of contaminant removed is estimated at $9.00 per kilogram.

Financial Assessment

In order to assess the potential financial and economic consequences of the costs associated with the implementation of each option, financial impact analyses were undertaken on eleven of the sector firms which represent fifteen ICS plants. One firm, Norton Advanced Ceramics, was removed from the analysis as financial data was not available after 1985.

There were ten firms for which historical financial data was available to establish a base case for the current financial position of the firm. Fifteen financial indicators were calculated. The analyses focused on net income after taxes and five ratios which are generally considered to be key ratios for evaluating the financial position of a company: quick ratio, return on sales, return on assets, return on capital and the current ratio.

The costs to the firm (plant) under a BAT option were then compared with the base case data to determine the impact on the firm's financial position.

The results indicate that with the exception of one firm, Nutrite Inc., BAT Option 1 and BAT Option 2 will not materially affect the financial position of the ICS, based on measures of the return on sales, return on assets and return on capital. Liquidity, based on measures of the current ratio and the quick ratio, would also not be materially affected.

Under BAT Option 4, three plants Cytec, Nutrite and ICI (Cornwall), incur a large portion of the total estimated $3 million in annualized after-tax costs for the Sector. Excluding these three plants, the average after-tax annualized cost to all other Sector firms required to install technology is less than $ 0.1 million. For the overall Sector, costs incurred will have some effect on the Sector's overall financial performance. Based on the latest year for which financial data is available, the Sector will experience a slight decrease in return on sales and return on assets. The current ratio and quick ratio will also decline slightly.

BAT Option 4 will result in an estimated 35% reduction in conventional contaminants, 15% reduction in EMPPL contaminants and 20% reduction in non-conventional contaminants. Overall total loading reductions are estimated at 22%, well above those for BAT Options 1, 2 and 3.

BAT Option 5, which is estimated to cost about $83 million per year, would cause a large reduction in cash-flow and net income for many firms. The financial viability of several firms could also be affected. Using the latest year for which financial information is available, the ICS would experience a negative return on sales and assets. Using a ten-year average of financial data, the Sector would experience a negative return on sales. Return on assets would be approximately zero. While this option would reduce loadings by 96%, the cost of achieving this reduction would be severe hardship for the Sector.

In summary, it was concluded that BAT Option 4 is the preferred option based on expected loading reductions achieved and a review of the financial position of Sector plants.

Table 4.7
Summary Of Total ICS Costs[1] By BAT Option

BAT Option	Costs (1991 dollars)	
	Capital ($ millions)	Operating ($ millions/yr)
Option 1	9.4	0.8
Option 2	1.4	0.6
Option 3	0.1	0.004
Option 4[2]	**17.0**	**1.85**
Option 5	297.1	90.1

Option 4 was used to develop limits.
[1] General Chemical Canada Ltd. costs are excluded from the Totals.
[2] Requiring membrane cell technology at ICI Canada (Cornwall) would result in a BAT 4 Option capital cost of $50.1 million.

Table 4.8
Projected Loadings And Reductions For the ICS*

BAT Options	Conventionals (thousands of tonnes/yr)		Non-conventionals** (thousands of tonnes/yr)		EMPPL (thousands of tonnes/yr)		Total (thousands of tonnes/yr)	
	Loading	Reduction	Loading	Reduction	Loading	Reduction	Loading	Reduction
Current	1.14	-	8.58	-	0.094	-	9.81	-
1	1.04	0.1 (8.8%)	8.58	0.0	0.094	0.0	9.71	0.1 (1.0%)
2	0.87	0.27 (23.7%)	8.39	0.19 (2.2%)	0.093	0.001 (1.1%)	9.35	0.46 (4.7%)
3	1.14	0.000	8.58	0.0	0.094	0.0	9.81	0.0
4	**0.74**	**0.40 (35.1%)**	**6.87**	**1.71 (19.9%)**	**0.080**	**0.014 (14.9%)**	**7.69**	**2.12 (21.6%)**
5	0.07	1.07 (93.9%)	0.44	8.14 (94.9%)	0.064	0.030 (31.9)	0.57	9.24 (94.2%)

Option 4 was used to develop limits.
* - Excludes General Chemical Canada Ltd. loading reductions.
**- Chloride, fluoride, sulphate and phenolics.

4.5 REFERENCES

1. Ontario Ministry of the Environment, "Municipal - Industrial Strategy for Abatement (MISA) - A Policy and Program Statement of the Government of Ontario on Controlling Municipal and Industrial Discharges into Surface Waters", June 1986, Queen's Printer.

2. Ontario Ministry of the Environment, "Global Search for BAT Options Applicable to Inorganic Chemical Sector Plants", October 1992, ISBN 0-7778-0210-4, Queen's Printer.

3. Ontario Ministry of the Environment, "Performance and Cost Evaluation of Best Available Technology Options for the Ontario Inorganic Chemical Sector", October, 1992, ISBN 0-7778-0209-0, Queen's Printer.

4. United States Environmental Protection Agency, "Development Document for Effluent Limitations Guidelines and Standards for Inorganic Chemicals Manufacturing Point Source Category", June 1982.

5. United States Environmental Protection Agency, "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Basic Fertilizer Chemicals Segment of the Fertilizer Manufacturing Point Source Category" EPA - 440/1-74-001-a, March, 1974.

6. U.S. Federal Register, 40 CFR Chapter 1, July 1, 1989.

CHAPTER 5

THE DEVELOPMENT OF EFFLUENT LIMITS

DEVELOPMENT DOCUMENT FOR THE INORGANIC CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

5.0 INTRODUCTION

Effluent limits for all ICS plants with process effluent streams were developed according to the principles and statistical procedures outlined in the IRC report[1].

5.1 TYPE OF EFFLUENT STREAMS TO BE LIMITED

Under the Effluent Limits Regulation for the ICS, all process effluent streams, discharged continuously or intermittently, will be limited in terms of contaminants discharged to the environment.

Cooling water streams used for once-through, non-contact cooling are not being limited under the Limits Regulation. These streams, however, will be required to be monitored weekly for assessment purposes. The assessment data may be used if needed, to develop control programs if it is found that process materials are contaminating the cooling water.

Storm water effluent discharges will not be limited under the Limits Regulation. However, ICS plants will be required to conduct a storm water control study (SWCS) within two years of promulgation of the Regulation. The results of the SWCS will be used to identify the need for control and prevention measures for storm water effluent discharges.

5.2 TYPE OF EFFLUENT LIMITS

Effluent limits may be expressed in one of the following three forms:

- loading limits
- production-based loading limits
- concentration limits

Production-based loading limits can only be derived if there is a direct relationship between the amount of contaminants discharged and production rate. Due to the nature and origin of process effluents generated within the Sector, it was not possible to establish a relationship between quantity of contaminants discharged and production rate at any of the Sector plants.

A large number of ICS process effluent streams originate from sources which are largely independent of daily production rate swings such as cooling tower blowdowns, cooling water streams, washdowns and cleanouts and pondwater discharges from inactive facilities.

In addition, to develop production-based limits for the ICS would have required the establishment of a large number of monitoring points to cover numerous individual manufacturing units particularly at the larger plants. Production-based limits were therefore not developed for the ICS Effluent Limits Regulation.

Concentration-based limits were also not developed for the ICS since dilution of the effluent could be used to meet such limits. Dilution would contravene the principle of water conservation.

The MISA goal of the virtual elimination of persistent toxic contaminants would be in jeopardy if dilution could be used to meet such limits.

Loading limits, expressed in terms of mass of contaminants discharged per day, were chosen as the best means of limiting plants in the ICS since loading limits would control the discharge of contaminants and encourage water conservation.

5.3 APPROACH TO LIMIT SETTING

In the development of effluent limits, consideration was given to adopting a sector or sub-sector approach to effluent limit setting in order to make the Regulation as simple as possible.

However, the ICS is extremely diverse in terms of products and type of manufacturing processes. This made it extremely difficult to develop a uniform limit number which would be applicable to all ICS sector plants. Furthermore, a sector or sub-sector approach would, depending on the limit number, allow for the potential of significant backsliding for some of the better performing plants if the limit was set too high. Conversely, the limit could be too stringent for other plants if derived based on performance at the better performing plants since the BAT required might not be economically achievable for a given plant due to significant differences in manufacturing operations.

Moreover, since the plants are so dissimilar, a significant cost would be incurred for plants if a single sector list of limited parameters was made a requirement for all even though only a portion of that list of parameters applied to any one plant's discharges.

A plant-by-plant approach was therefore adopted for limit setting in the ICS.

5.4 THE CANDIDATE PARAMETER LIST

The initial list of candidate parameters for limit setting was based on the effluent monitoring database collected during the regulated monitoring period. Parameters were listed as found for a particular site unless a proportion of 0.9 of the concentration results had values less than the Regulation Method Detection Limit (RMDL).

Of the one hundred and fifty-four parameters monitored, a total of one hundred were found in ICS effluents. These found parameters, shown in Table 5.1, formed the initial candidate list for limits development.

The found parameters are also shown, by individual plant site, in Appendix A, Table A-1. The parameter, pH, was not included in the individual plant found parameter lists since it is handled separately in the Regulation and applies to all plants.

Table 5.1 - Parameters Found In ICS Sector Effluents

ATG	PARAMETER	ATG	PARAMETER
1	COD	16	Chloroform
2	Cyanide Total	16	Chloromethane
3	Hydrogen ion (pH)	16	Cis-1,3-Dichloropropylene
4	Ammonia plus Ammonium	16	Dibromochloromethane
4	Nitrate+Nitrite	16	Ethylene dibromide
4	Total Kjeldahl Nitrogen	16	Methylene chloride
5	DOC	16	Tetrachloroethylene
5	TOC	16	Trans-1,2-Dichloroethylene
6	Total phosphorus	16	Trans-1,3-Dichloropropylene
7	Specific conductance	16	Trichloroethylene
8	Total suspended solids	16	Trichlorofluoromethane
8	Volatile suspended solids	16	Vinyl chloride
9	Aluminum	17	Benzene
9	Beryllium	17	Styrene
9	Boron	17	Toluene
9	Cadmium	17	m-Xylene and p-Xylene
9	Chromium	17	o-Xylene
9	Cobalt	18	Acrolein
9	Copper	18	Acrylonitrile
9	Lead	19	Benzylbutylphthalate
9	Molybdenum	19	Bis(2-ethylhexyl) phthalate
9	Nickel	19	Di-n-butyl phthalate
9	Strontium	19	Diphenyl ether
9	Thallium	19	Fluoranthrene
9	Vanadium	19	Phenanthrene
9	Zinc	19	Pyrene
10	Antimony	20	Phenol
10	Arsenic	23	1,2,3,4-Tetrachlorobenzene
10	Selenium	23	1,2,3,5-Tetrachlorobenzene
11	Chromium (hexavalent)	23	1,2,3-Trichlorobenzene
12	Mercury	23	1,2,4,5-Tetrachlorobenzene
14	Phenolics (4AAP)	23	1,2,4-Trichlorobenzene
15	Sulphide	23	2,4,5-Trichlorotoluene
16	1,1,2,2-Tetrachloroethane	23	Hexachlorobenzene
16	1,1,2-Trichloroethane	23	Hexachlorobutadiene
16	1,1-Dichloroethane	23	Hexachlorocyclopentadiene
16	1,1-Dichloroethylene	23	Hexachloroethane
16	1,2-Dichlorobenzene	23	Octachlorostyrene
16	1,2-Dichloroethane	23	Pentachlorobenzene
16	1,2-Dichloropropane	24	PCDDs\PCDFs (11 compounds)
16	1,3-Dichlorobenzene	25	Oil and Grease
16	1,4-Dichlorobenzene	27	PCBT
16	Bromoform	11	Chloride
16	Bromomethane	12	Fluoride
16	Carbon tetrachloride	13	Sulphate

5.5 SELECTION OF PARAMETERS FOR LIMITS

A formal screening process was applied to each of the parameters on the candidate list for each plant site to ensure that the parameter was actually being discharged as the result of plant operations and was not an artifact of sampling and analytical errors or a pass-through parameter from the intake water. A review of BAT and its effectiveness for controlling each parameter also had to be made before a parameter was selected for limits at a given site.

The first step in the development of the final parameter list for limits for each plant, was to put together a candidate parameter list consisting of all of the parameters that were found* in the plant effluents during the twelve-month regulatory monitoring period. The candidate list then underwent editing on the basis of criteria described in this section.

QA/QC Data Assessment

Quality control/quality assurance data were examined after candidate parameter selection to determine whether the effluent monitoring data for the found parameters were of reliable quality and acceptable for use in the development of effluent limits.

The QA/QC data assessment involved the retrieval and screening of the field QA/QC data and corresponding process effluent monitoring data for each ICS plant. The data were sorted, summarized and evaluated according to QA/QC procedures outlined in the Issue Resolution Committee report[1]. A parameter was removed from further consideration in the effluent limits setting process if the QA/QC assessment indicated that its presence in the effluent stream was suspect.

The QA/QC assessment for the ICS database confirmed that virtually all of the effluent monitoring data were acceptable for use in the development of effluent limits. Only two parameters, copper at Cabot Canada and hexachlorocyclopentadiene at ICI Cornwall, were deemed unsuitable for limit setting at each of the two plants because of QA/QC concerns.

Full details of the QA/QC data assessment are presented in the report on the analysis of the Quality Assurance and Quality Control Data for the ICS[2].

Assessment of Possible Surrogate Parameters

It was recognized that it would be possible to limit certain key parameters which could serve a surrogate function in that, their control would also indicate control over other similar parameters. Use of surrogate parameters would allow analytical cost savings without jeopardizing the Ministry's need for assurance that plant BAT facilities were being operated well.

* found -- a parameter was listed as found unless a statistical proportion of 0.9 of the concentration data results (at a 95% confidence level) was less then the Regulation Method Detection Limit (RMDL) -- this is referred to as the 90/10 edit rule

Both sector-wide and site-specific surrogate parameters were developed for limit setting.

Although statistical correlations were not performed, Best Professional Judgement (BPJ) was used to determine which parameters could serve a surrogate function.

Sector-Wide Surrogate Parameter Selection

The following is a comparison of five key conventional parameter test groups to determine the most appropriate surrogate parameters:

COD (chemical oxygen demand);

- measures both organic and inorganic substances (such as sulphides, ammonia and metals) by chemical oxidation
- the analytical method has a relatively high RMDL of 10 mg/l

DOC (dissolved organic carbon);

- measures total soluble organic carbon
- the analytical method has a relatively low RMDL of 0.5 mg/l

TOC (total organic carbon);

- measures both dissolved and suspended carbon
- the analytical method has a relatively high RMDL of 5 mg/l

DOC was chosen as a sector-wide surrogate parameter for limits in place of COD and TOC for the following reasons:

- much lower RMDL than TOC and COD
- more likely to reflect trace organics than TOC and COD
- particulate organic carbon will be measured as part of TSS
- a larger database exists for DOC since it was monitored at a higher frequency during the Monitoring Regulation than TOC and COD

A similar comparison was undertaken between Total Suspended Solids (TSS) and Volatile Suspended Solids (VSS):

VSS (volatile suspended solids);

- measure of the organic floc associated with biological treatment systems
- a component of total suspended solids measurements
- the analytical method has a relatively high RMDL of 10 mg/l
- sector more likely to have inorganic based solids

TSS (total suspended solids);

- measures both organic solids (VSS) and inorganic solids
- the analytical method has a lower RMDL at 5 mg/l than VSS
- less costly and quicker test than VSS

TSS was chosen as a sector-wide surrogate parameter for limits in place of VSS on the basis of lower test cost, lower detection levels and because the TSS test also measures VSS.

Total phenolics(4AAP) was used for limits in place of any specific phenol limit mainly on the basis of method speed and lower cost.

Other Surrogate Parameters

In addition to the sector-wide surrogate parameters, plant-specific surrogates were also selected on the basis that, with respect to parameters it was replacing, the surrogate had to be:

- similar in response to treatment i.e within the same analytical test group

- present in the effluent at a higher concentration than the parameters it was replacing

Additional Considerations for Parameter Selection

Other factors which were considered in making the final selection of parameters for limits include the following:

a) - Contaminant Concentration Level

Parameters were removed from a plant's candidate parameter list if found at levels equal to or less than the regulation method detection limit (RMDL).

b) - Pass-Through Contaminants

Contaminants were deleted from a plant's candidate parameter list if their origin was solely attributed to intake water.

Two contaminants in particular, boron and strontium, were considered to be universally originating from intake water sources. Strontium like calcium is a naturally occurring constituent of hard water while boron is sometimes found naturally in water. Boron was found at concentrations levels of less than 1 mg/L, which is typical of drinking water levels. These two contaminants were therefore removed from the ICS candidate parameter list since they were considered to be "pass-through" contaminants.

c) - Insufficient Performance Data

A parameter was removed from a plant's candidate parameter list if an insufficient number of data points (typically less than 6) were available to calculate variability factors.

Sector-Wide Limited Parameters

In addition to pH, all ICS plants are being limited for the following three core conventional parameters irrespective of whether they qualified as being "found" during the monitoring period:

- total suspended solids
- dissolved organic carbon
- total phosphorus

The rationale for including these parameters at all plants is summarized below:

Total Suspended Solids (TSS):
- TSS is a fundamental control parameter for the inorganic chemical industry which processes solids and is an indicator parameter for the efficiency of settling systems.

Dissolved Organic Carbon (DOC):
- Limits on DOC will provide control on trace organic contaminants primarily originating from the use of oils and organic solvents in the Sector.

Phosphorus:
- A limit on phosphorus will fulfil the Great Lakes Water Quality Agreements that indicate that phosphorus levels should be controlled as much as possible.

Other conventional contaminants such as oil and grease, ammonia, nitrates and TKN were listed as limit candidates for a plant if they were found during the twelve-month monitoring period.

Specific conductance was not considered for limits in the ICS since it is difficult to set quantifiable, predictable limits for this parameter based on the recommended BAT technologies.

BAT Performance Data

Where specific end-of-pipe or in-plant BAT performance data for a given found parameter was not available, the current plant performance was used as the basis for limits.

In addition, where current plant discharges of a given parameter were lower than would be predicted on the basis of end-of-pipe or in-plant BAT treatment, the current performance data was used for setting a limit for that parameter.

Therefore, no parameters were deleted because of the lack of BAT performance data.

5.6 THE FINAL LIST

Following the screening processes, a total of fifty parameters, including eleven polychlorinated dibenzo-p-dioxin and furan congeners, remained on the final list of parameters for limits for the ICS as a whole.

Table 5.2 presents the final list of limited parameters for the ICS which is a compilation of individual plant lists. Appendix A provides tables of parameters found in ICS effluents by individual plant site along with information for each parameter showing its status for limits.

Where parameters were not included in the final limits list for a site, specific reasons are provided in the tables in Appendix A.

Candidate Substances for Bans or Phase-Outs

In April 1992, the Ministry published a Report[3] which listed twenty-one candidate chemicals for banning, phasing out or for use/release reductions. Of the twenty-one parameters, four were found in the effluents from Sector plants. Table 5-3 lists the four parameters and the plants where they were found.

These chemicals are persistent and bioaccumulative and therefore special care was taken to ensure that they were included for limits at the plants where they were found.

Polychlorinated Dibenzodioxins and Dibenzofurans (PCDDs/PCDFs)

This special group of compounds on the Ministry bans or phase-outs list is defined in the regulation under the generic term of "specific parameters". Levels of PCDDs/PCDFs inplant discharges must be non-measurable which is defined in the regulation as follows:

2,3,7,8-tetrachlorodibenzo-p-dioxin concentration	$<$ 20 picograms/L
2,3,7,8-tetrachlorodibenzofuran concentration	$<$ 50 picograms/L
total toxic equivalent concentration (TEQ) of all 2,3,7,8-substituted dioxin and furan congeners	$\leq$ 60 picograms/L

The method of calculating a TEQ value from the analysis of seventeen 2,3,7,8-substituted dioxin and furan congeners is outlined in the Ministry sampling and analytical protocol[4].

While all plants under the regulation are subject to the non-measurable limits for the "specific parameters", quarterly self-monitoring for PCDDs/PCDFs is required only at those plants where past Ministry and plant data have indicated the presence of these compounds in the plant effluents.

Table 5.2 - Final List Of ICS Limited Parameters

ATG	PARAMETER
2 3	Cyanide,Total Hydrogen ion, pH
4 4 4	Ammonia + Ammonium Nitrate + Nitrite Total Kjeldahl Nitrogen
5a	Dissolved Organic Carbon (DOC) *
6	Total Phosphorus *
8	Total Suspended Solids *
9	Aluminum Cadmium Chromium Copper Molybdenum Nickel Lead Vanadium Zinc
10	Arsenic Antimony Selenium
12	Mercury
14	Phenolics (4AAP)
15	Sulphide
16	Chloroform Carbon Tetrachloride Tetrachloroethylene
17	Toluene
23	1,2,3 Trichlorobenzene 1,2,4 Trichlorobenzene Hexachlorobenzene Hexachlorobutadiene Hexachloroethane Octachlorostyrene Pentachlorobenzene
24	Polychlorinated dibenzo-p-dioxin/furans **
25	Oil and Grease
27	PCBT
11	Chloride
12	Fluoride
13	Sulphate

* TSS, DOC and Phosphorus are limited at all ICS plants

** Includes 2,3,7,8 TCDD and five congeners for each dioxin and furan group (i.e. eleven contaminants for ATG 24). Although 2,3,7,8 TCDD was not found during the monitoring period, it is included for limits as part of ATG 24.

TABLE 5.3

Chemicals on the Candidate Substances List for Bans or Phase-Outs Limited at ICS Plants

Bans or Phase-out Parameter	# of Sites where Limited	Plant Sites
Arsenic	Four	General Chemical Canada Ltd. ICI Canada Inc., Cornwall ICI Canada Inc.-Conpak (Cornwall) Sulco Chemicals Limited
Mercury	Five	Albright and Wilson Americas General Chemical Canada Ltd. ICI Canada Inc., Cornwall ICI Canada Inc.-Conpak (Cornwall) Nutrite Inc.
PCDD/PCDF	Nine	Cabot Canada Ltd. Cytec Canada Inc. General Chemical Canada Ltd. ICI Canada Inc., Cornwall ICI Canada Inc.-Conpak (Cornwall) Nutrite Inc. Praxair Canada Inc. (Moore) Praxair Canada Inc. (Sarnia) Praxair Canada Inc. (Sault Ste. Marie)
Hexachlorobenzene	Two	ICI Canada Inc., Cornwall ICI Canada Inc.-Conpak (Cornwall)

5.7 STATISTICAL DERIVATION OF LIMITS

Effluent limits were developed for process effluent streams according to the statistical procedures outlined in the Issue Resolution Committee reports[1]. Daily maximum and monthly average limits were calculated for each of the limited parameters using BAT performance data.

In general, loading limits are calculated as follows:

Loading limit (kg./day) = LLTA x VF

where LLTA is the long term loading average
VF is the loading variability factor based on either daily or 4 or 30 point average loadings

For limits based on daily samples, the 99th percentile variability factor was used (LVF1 in Table B, Appendix B). For monthly average plant loading limits, the 95th percentile variability factors were used corresponding to either 4 or 30 day averages from weekly or daily sampling (LVFML in the Tables in Appendix B).

Daily maximum and monthly average loading limits were calculated as follows:

Where daily loading performance data was not available:

- A long term average concentration value was determined for a parameter selected for limits based on BAT performance data. Where no additional reductions were specified for a limited parameter in the BAT report, the plant was deemed to be at BAT performance for that parameter and the plant's current performance level was used as a basis for determining a limit.

- A long term average flow rate was determined using BAT flow performance data. Plant performance flow data was used for the purposes of calculating long term average flow data if a specific BAT flow performance value was not available for a particular industrial sub-group.

- A long term average loading value was calculated as the product of the long term average concentration value and the long term average flow rate for each plant.

- Daily and monthly variability factors were calculated for each limited parameter on each process effluent stream using plant performance data. For plants with unusually high variability factors for specific parameters, an upper bound of 10 was used for daily variability factors while monthly variability factors were adopted from better performing facilities.

- Daily maximum and monthly average loading limits, expressed in kilograms of contaminant per day, were calculated for each effluent stream as the product of the long term average loading value and the respective variability factor.

- Daily maximum and monthly average plant loading limits were calculated as the sum of the individual loading limits for each effluent stream for plants with more than a single effluent.

- Statistical outliers were included since it could not be determined that their values were not representative of actual operating conditions.

- Limits were specified for a common set of core conventional parameters at all sites. Some of these parameters, however, were found at levels which were less than the Regulation Method Detection Limit (RMDL) and consequently a variance could not be determined. Limits for such parameters were therefore based on four times RMDL and two times RMDL for the daily and monthly average limits respectively.

Appendix B presents for each limited process effluent stream, current and BAT Option 4 performance values which were used as the basis for calculating the plant effluent loading limits specified in the ICS Effluent Limits Regulation.

In cases where effluent limits are being specified at a plant through existing Certificate of Approval, the same limit values were transferred to the Effluent Limits Regulation if they were more stringent than those calculated using the MISA process.

Compliance With The Limits

Because the limits have been derived on the basis of the 99th percentile for daily maximum loadings and the 95th percentile for monthly average loadings, there is an implied 50% probability that even a well operated BAT plant may have an expectation of one exceedance in every one hundred daily measurements and five exceedances in every one hundred monthly average values. This may amount to 3-4 exceedances per year for each daily monitored parameter under limits and one exceedance in every 20 months for each parameter with a monthly limit.

To increase the potential for avoiding the statistical exceedances, additional effort to better control discharges through equipment improvements or more efficient operation will be required on the part of the plants.

5.8 NON-CONTACT COOLING WATER ASSESSMENT PARAMETERS

Monitoring requirements for non-contact cooling water effluent streams are included in the Regulation so that potential leaks of contaminants from process heat transfer equipment can be detected. A basic list of assessment parameters was established for all plants with non-contact cooling water effluent streams with consideration for additional site-specific parameters where warranted by operations.

All ICS plants which discharge non-contact cooling water effluent streams will be required to monitor these streams for the following basic list of conventional parameters:

- pH
- TSS
- specific conductance
- oil and grease.

Additional parameters are listed for site-specific situations where the potential exists for contact with specific process materials. For instance, the total nitrogen group is specified for nitrogen based fertilizer and explosives plants, while total phosphorus is included for phosphoric acid plants.

5.9 ENVIRONMENTAL BENEFITS

The proposed Effluent Limits Regulation for the ICS represents a major step forward towards the Ministry's goal of the virtual elimination of persistent toxic substances which will protect human health and aquatic life in Ontario.

Improvements in the overall water quality in the St. Clair, St. Lawrence, Detroit and Niagara Rivers will be achieved due to reduced loadings of toxic chemicals in open water and river bottom sediments. This will result in reduced levels of contaminants in fish and aquatic birds and reduced health risks for populations consuming large amounts of fish. The discharged effluents will be non-acutely lethal. Any long term chronic toxicity impacts of the discharges will also be determined.

Table 5.4 presents a summary of the estimated impact of the Limits Regulation on loading reductions, under BAT Option 4, for the ICS.

Table 5.4
Contaminant Loading Reductions for the ICS (excluding General Chemical)

Contaminants	Current Loading (tonnes/yr) (1990)	Final Loading (tonnes/year)	Total Loading Removed (tonnes/year)	Percent Removal (%)
Conventionals[1]	1,143	747	396	35
Non-Conventionals[2]	8,576	6,868	1,708	20
EMPPL	93.9	79.3	14.6	16
Total Contaminants	9,813	7,694	2,119	22

1 = TSS, DOC, oil and grease, TKN(ammonia), nitrates, phosphorus

2 = Chloride, fluoride, sulphate, phenolics(4AAP)

5.10 REFERENCES

1. Ontario Ministry of the Environment, "Issues Resolution Process - Final Report Summary", September 1991, ISBN 0-7729-8974-5, Queen's Printer.

2. Ontario Ministry of the Environment, "Municipal-Industrial Strategy for Abatement (MISA), Report on the Assessment of the Quality Assurance and Quality Control Data for the Inorganic Chemical Sector", MISA Industrial Section, Water Resources Branch, February, 1993, Queen's Printer for Ontario.

3. Ontario Ministry of the Environment, "Candidate Substances List for Bans or Phase-Outs", April 1992, ISBN 0-7729-9764-0, Queen's Printer.

4. Ontario Ministry of Environment and Energy, MISA, "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", ISBN 0-7778-1880-9, August 1994.

CHAPTER 6

THE EFFLUENT LIMITS REGULATION

DEVELOPMENT DOCUMENT FOR THE INORGANIC CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

6.0 INTRODUCTION

This section highlights the main requirements specified in the Regulation. The legal language of the Regulation is simplified, the reasons for some of the requirements are elaborated, and directions are provided to additional information to assist in the compliance with the Regulation's requirements. A copy of the legal version of the Regulation is provided in Appendix C.

6.1 OVERVIEW OF THE REGULATION

The Effluents Limits Regulation for the Inorganic Chemical Sector (ICS) is made under the Environmental Protection Act of the Province of Ontario. Its full title is, "Effluent Monitoring and Effluent Limits - Inorganic Chemical Sector".

The purpose of the Regulation is to reduce the quantity of contaminants discharged from the ICS Plants. This will be done by:

- placing loading limits on the discharge of specific contaminants
- requiring effluents to be non-acutely lethal
- monitoring cooling water and
- evaluating storm water discharges

The Regulation requirements with respect to monitoring begin ninety days after the day on which the Regulation is filed. The requirements to meet the chemical parameter and lethality limits come into force three years after the day on which the Regulation is filed.

The three year implementation period is provided to allow plants to install Best Available Technology (BAT) or to modify their processes to meet the limits. The current projection of the filing date is sometime early in January 1995.

The Regulation requires that the listed discharger plants sample and analyze their designated process, cooling water and combined effluents at the specified monitoring frequencies.

Plants must meet daily and monthly average loading limits for process effluents that are set out for each plant in Schedule 2 of the Regulation. All process effluents must also meet concentration limits for polychlorinated dibenzodioxins and dibenzofurans. All final discharges must pass acute lethality tests using rainbow trout and Daphnia magna.

Plants must also monitor their cooling water and combined effluent discharges for a list of assessment parameters shown in Schedule 4 of the Regulation. These effluents must also meet the acute lethality limits.

Speedy reporting of non-compliances and specified record keeping in support of the monitoring are other main requirements.

Six documents, which provide "how to" information, are referenced in the Regulation:

- Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater[1]
- Protocol for Conducting a Storm Water Control Study[2]
- Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout[3]
- Reference Method for Determining Acute Lethality of Effluents to Daphnia magna[4]
- Test of Larval Growth and Survival Using Fathead Minnows[5]
- Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia[6]

The requirements of the Regulation are organized under ten parts covering forty-one sections. The requirements under each of the ten parts can be summarized as follows:

Part I - General

- definitions; purpose; application; obligations with respect to legal instruments; non-application of the General Effluent Monitoring Regulation; by-passes; sampling and analytical procedure - reference to the sampling and analytical protocol document

Part II - Sampling Points

- the sampling points as listed in the Schedules are to be used; new sampling points require notification of the Director

Part III - Calculation of Loadings

- requirements for the calculation of loadings for process and process batch effluents, cooling water and combined effluents

Part IV - Parameter and Lethality Limits

- compliance requirements with loading limits listed in Schedule 2; concentration limits for 2,3,7,8-tetrachlorodibenzo-para-dioxin, 2,3,7,8-tetrachlorodibenzofuran and seventeen 2,3,7,8-substituted dioxin and furan congeners in terms of Toxic Equivalent Concentration (TEQ); lethality limits at plant outfalls based on rainbow trout and Daphnia magna testing

Part V - Monitoring - Chemical Parameters

- monitoring requirements -- sample pick-up times, analytical obligations for daily, weekly, quarterly process effluent sampling and annual QA/QC sampling; provision for reduced frequency of monitoring from daily to three times per week for good performance; cooling water and combined effluent chemical parameter assessment

Part VI - Monitoring - Acute Lethality and Chronic Toxicity

- acute lethality testing with rainbow trout and Daphnia magna; requirement for a Toxicity Elimination Report if effluents are toxic; chronic toxicity testing with Fathead Minnows and Ceriodaphnia dubia

Part VII - Effluent Volume

- flow measurement and accuracy requirements; calculation of plant volumes

Part VIII - Storm Water Control

- requirement for a storm water control study as outlined in the referenced storm water control study protocol; exemption criteria; timing of study completion

Part IX - Records and Reports

- record keeping; annual report for the public; reports to the director - general information, non-compliance with limits, quarterly reports of loadings and flow, semi-annual reports of chronic toxicity results

Part X - Commencement and Revocation Provisions

- revocation of the ICS Monitoring Regulation; in force dates for the commencement of monitoring and flow measurement and for compliance with limits

Schedules -

- seven schedules, referenced in the Regulation, follow the text of the Regulation

6.2 EXPLANATORY NOTES

In this section, the requirements under each of the ten parts and forty-one sections of the Regulation are discussed in more detail with elaboration of the rationale behind the requirements.

PART I - GENERAL

Section 1 - Interpretation

Section 1 provides definitions to explain and to clarify key terms used in the Regulation to ensure a common understanding. The definitions cover:

- terms having several possible interpretations
- technical terms which may not be in common use
- terms which have a different meaning in the Regulation from those in the dictionary
- terms specific to the ICS Regulation

Section 2 - Purpose

The purpose of the Regulation is to control the quantity of contaminants discharged to watercourses by the Sector plants.

Section 3 - Application

The Regulation only applies to the twenty-five plants listed in Schedule 1. It does not apply to dischargers of effluents to a Municipal sewer. New plants or new effluents can be brought under regulation through amendments.

Section 4 - Obligations Under Approvals, Orders, etc.

The Regulation does not exempt listed plants from any other obligations under Certificates of Approval, Control Orders, Directions or other instruments issued under any Act.

The Ministry will endeavour to ensure that duplication of requirements is avoided but in cases where duplication exists, the more stringent requirements will apply.

Section 5 - Non-Application of the General Effluent Monitoring Regulation

The tie-in between the IC Sectoral Monitoring Regulation (O. Regulation 395/89) and the General Effluent Monitoring Regulation (O. Regulation 695/88) has been severed. The Sectoral Monitoring Regulation is revoked with the filing of this Regulation and therefore the General Effluent Monitoring Regulation becomes void.

Section 6 - By-passes

On the date when the limits come into effect, plants will not be able to discharge any process effluent unless it flows past a regulated sampling point.

Section 7 - Sampling and Analytical Procedures

The procedures for sampling and analysis to be used under the Regulation are referenced in a Ministry protocol document[1]. The Protocol provides specific information on sampling methods, sample containers and volumes, preservation chemicals and maximum storage times.

Similarly, on the analytical side, the Protocol provides information on sample preparation, methods of analysis, required method detection limits and laboratory quality control.

The Regulation requires that all sampling equipment be maintained to ensure that the samples collected, reflect the level of discharge.

PART II - SAMPLING POINTS

Section 8 - Sampling Points To Be Used

The sampling points to be used are specified for each plant - Schedules 2 and 3 for sampling points on process effluent and process effluent batch streams and Schedule 4 for sampling points for assessment of cooling water and combined effluents.

The discharger must use the designated sampling points no later than ninety days after the day on which the Regulation is filed.

All of the sampling points have been designated prior to the filing of the Regulation.

The detailed official record of the sampling points for each plant, including identification number, name and plot plan location, signed and dated by a plant official, is on file with the Ministry and is linked to the Regulation through the reference to the record on Schedules 2, 3 and 4 in the Regulation.

The establishment of new sampling points or the elimination of current sampling points listed in the Regulation requires written notification of the Director within thirty days of the change. The notification must include the name, identification number and location of the sampling point together with an updated plot plan showing the location of all of the sampling points to be regulated.

For pH measurement only, subsections 23(7) and 23(8) allow the use of an alternate sampling point located downstream of the designated sampling point but prior to discharge to surface water or prior to discharge to a common industrial sewer. Written notification and location information must be provided to the Director prior to use of the alternate sampling point.

Where on-line pH measurement is used, the location of the installation does not need to be at the exact location of the designated sampling point where composite samples are being taken, as long as the pH measurement at its location is representative of the pH at the designated sampling point.

PART III -- CALCULATION OF LOADINGS

Section 9 - Calculation of Loadings - General

The actual analytical concentration value is to be used in loading calculations unless it is less than 1/10 of the Regulation Method Detection Limit (see the "Protocol For The Sampling And Analysis of Industrial/Municipal Wastewater"[1]) in which case the loading is deemed to be zero for that parameter.

The loading calculations for process effluents and process batch effluents must be done as soon as is reasonably possible after the analytical results are available. For cooling water and combined effluents, loading calculations must be done, at least in time to meet the quarterly reporting requirements.

Section 10 - Calculation of Loadings - Process Effluent - General

A daily plant loading in kilograms per day must be calculated for each limited parameter for each designated process effluent stream whenever samples are required to be collected (see Schedule 2 for frequency of sample collection). The daily plant loading for sites with single process effluent streams is the single stream loading.

For sites with multiple process effluent streams, the daily plant loading for each limited parameter is the sum of the loadings of that parameter in the individual process effluent streams designated for sampling for that parameter (see Schedule 3).

A monthly average process effluent plant loading in kilograms per day must be calculated for all parameters sampled daily (or thrice-weekly) or weekly during each month. The monthly average plant loading is the arithmetic mean of the daily plant loading values.

Section 11 - Calculation of Loadings - Process Effluent - Batch

A process effluent batch loading in kilograms per batch must be calculated for each designated process effluent batch stream (see Schedule 3).

Section 12 - Calculation of Loadings - Cooling Water

The calculations are done in the same way as for process effluents to provide a daily cooling water effluent plant loading once per week and a monthly average cooling water effluent plant loading based on the average of weekly determinations.

Section 13 - Calculation of Loadings - Combined Effluent

The daily and monthly average combined effluent plant loadings are calculated in the same way as for cooling water.

Section 14 - Calculation of Additional Loadings - Combined Effluent

The combined effluent designation allows a plant to monitor several cooling water streams (including possible storm water contributions) and a co-mingled treated process effluent stream(s) at a single point downstream of their confluence rather than requiring individual cooling water stream analysis.

For each combined effluent stream, the loading contributed from the process effluent stream flowing into the combined effluent must be calculated for parameters common to the streams for the days on which the combined effluent stream is sampled.

Daily and monthly average process effluent contributions to the loadings in the combined effluent stream must be calculated. The process effluent loading contributions are the process loadings calculated only for the day on which the combined effluent is sampled.

PART IV - PARAMETER AND LETHALITY LIMITS

Section 15 - Parameter Limits

Each plant must meet the daily and monthly average process effluent plant loadings specified in Columns 3 and 4 respectively of its specific Schedule 2 for the parameters shown in Column 1.

In addition, plants with process effluent batch discharges must meet the batch discharge limits set out in Column 5 of Schedule 2.

All plants must ensure that their process and process batch effluents meet the following concentration limits for three polychlorinated dibenzodioxin and dibenzofuran groups:

- 2,3,7,8-tetrachlorodibenzo-p-dioxin — <20 picograms/L
- 2,3,7,8-tetrachlorodibenzofuran — <50 picograms/L
- total toxic equivalent concentration (TEQ) of seventeen 2,3,7,8 substituted congeners — ≤60 picograms/L

A listing of the 2,3,7,8 substituted congeners and the method for calculating their total toxic equivalent concentration are described in the Sampling and Analytical Protocol[1].

Plants where polychlorinated dibenzodioxins and dibenzofurans (PCDD/PCDFs) have been found have quarterly PCDD/PCDF self-monitoring requirements set out in their Schedule 2 or 3 tables.

Process effluents and process batch effluents must meet a pH limit range of 6.0 to 9.5 at all times. When alternate sampling points are designated for pH, the 6.0 to 9.5 limit also applies.

Section 16 - Lethality Limits

Acute lethality limits apply only to those sampling points that are designated in Schedule 5. Grab samples from the designated sampling points on process, process batch, cooling water and combined effluent streams must be non-toxic to rainbow trout and Daphnia magna as demonstrated by specific acute lethality tests where the mortality must not exceed 50% of the organisms in 100% effluent.

PART V - MONITORING - CHEMICAL PARAMETERS

Section 17 - Monitoring - General

Collection of samples is not required on a day when there is no process effluent discharged from the plant.

The Regulation requires that sufficient sample volume be taken to perform the required analyses and that all analyses be completed as soon as is reasonably possible.

A three hour composite sample pick-up window between 7:00 am and 10:00 am is provided. The nominal twenty-four hour composite sample period can be as short as twenty-one hours or as long as twenty-seven.

For plants with a large number of sampling points, the Director may allow deviations from the sample pick-up window upon written request but the Director may also revoke the allowance in writing if circumstances at the plant warrant it.

Sections 18, 19, 20 - Monitoring - Process Effluent - Daily, Weekly, Quarterly

The requirements for daily, weekly and quarterly sampling and analysis are set out in Schedule 2. For multi-process effluent plants, the specific parameters to be analyzed in each effluent are shown in Schedule 3. The requirement for daily pH monitoring resides in a separate section of the Regulation (Section 23) and therefore pH is not specifically listed in Schedule 2.

For parameters with an initial daily monitoring frequency requirement, relief is provided to three times per week monitoring for good performance. The performance criterion is a monthly average plant loading equal to or less than seventy-five percent of the monthly average plant loading limit for that parameter for twelve consecutive months.

A return to daily monitoring for a parameter is automatic, if during any twelve consecutive months, the daily plant loading limit for the thrice-weekly monitored parameter is exceeded three times or the monthly average loading limit is exceeded twice. To qualify again for thrice-weekly monitoring, the good performance criterion must be met for that parameter.

Weekly samples must be collected at least four days apart. Quarterly samples must be collected at least forty-five days apart. The quarterly samples must be picked-up on the same day as the weekly samples.

Section 21 - Monitoring - Process Effluent - Batch

Each process effluent batch discharge must be sampled over the period of the batch discharge.

Section 22 - Monitoring - Process Effluent - Quality Control

Duplicate, travelling blank and travelling spiked blank samples, making up the Quality Assurance and Quality Control (QA/QC) field samples are required annually beginning in the year after the year of filing of the Regulation.

The duplicate samples are to be analyzed for the same parameters as are shown in Schedule 2 for weekly and quarterly monitoring for the plant. QA/QC samples must be collected at least six months apart on the same day as the weekly process effluent samples.

The sampling and analytical protocol[1] provides additional directions on QA/QC analysis requirements.

Section 23 - Monitoring - Process Effluent - pH Measurement

Plants are required to measure pH daily by collecting three grab samples over a 24 hour period. The first sample must be taken between 7:00 a.m. and 10:00 a.m. or during the composite sample pickup time window allowed by the Director. The other two grab samples may be collected at any time during the 24 hour period as long as all three samples are collected at least four hours apart.

Use of an on-line pH analyzer is allowed in place of grab sampling. The first reading of pH must be taken in the same time period as would be applicable to a grab sample. Two other readings must be taken over the 24 hour period so that all three readings are at least four hours apart.

Any recorded pH readings over the 24 hour period outside of the regulated pH range of 6.0 - 9.5, not the result of analyzer malfunction, are reportable as exceedances.

For pH measurement, upon written notification of the Director, the plant may use an alternate sampling point downstream of the designated sample point for composite samples, but before the point of discharge to a surface water or to an industrial sewer.

A composite sample for pH is required for process effluent batch streams.

Sections 24, 25 - Monitoring - Cooling Water/Combined Effluent- Weekly Assessment

There are no limits in the Regulation for cooling water and combined effluent discharges.

Cooling water and combined effluents require weekly monitoring for the assessment parameters shown in Schedule 4 for each plant. The samples are to be picked-up on the same day as the weekly process effluent samples. A minimum interval of four days is required between successive sampling.

Section 26 - .Monitoring - Cooling Water and Combined Effluent - pH and Specific Conductance Measurement

Three grab samples, in a 24 hour period, at least four hours apart, for each of pH and specific conductance are required as part of the assessment monitoring for cooling water and combined effluents.

An on-line analyzer may be used for pH or for specific conductance in place of grab samples. Any three pH values, at least four hours apart, recorded by the on-line unit in a 24 hour period, may be reported.

PART VI - MONITORING - ACUTE LETHALITY AND CHRONIC TOXICITY

Sections 27, 28 - Monitoring - Acute Lethality Testing - Rainbow Trout, Daphnia magna

Both rainbow trout and Daphnia magna acute lethality single concentration, 100% effluent tests are required monthly at all sampling points where chemical monitoring is required (process effluents, process batch effluents, combined effluents and cooling water). All of these sampling points are listed in Schedules 2, 3 and 4 of the Regulation.

Acute lethality limits apply only to sampling points on final discharges to watercourses. These points are designated for each plant in Schedule 5. The acute lethality testing of the remaining Schedule 2, 3 and 4 sampling points is for assessment purposes only.

Both lethality samples must be taken on the same day, tied to a day when weekly sampling for the analysis of limited parameters is being done. An interval of at least fifteen days is required between successive monthly lethality tests.

The acute lethality testing frequency at a sampling point for either species can be reduced to quarterly following twelve consecutive monthly passes for that species (mortality of no more than 50% of the test species). Notification of the Director as to the change in frequency is required. An interval of at least forty-five days is required between successive quarterly tests.

A single failure at the quarterly frequency for a species, causes sampling to revert to monthly until twelve consecutive passes for that species are achieved.

The rainbow trout and Daphnia magna acute lethality tests are to be performed according to Environment Canada procedures referenced in the Regulation.

Section 29 - Assessment Monitoring - Acute Lethality

If testing at any acute lethality sampling point results in three test failures in any twelve consecutive months for rainbow trout or Daphnia magna, the discharger must prepare a Toxicity Elimination Report for the species for which the failure occurred.

The information required for the Report is set out in subsection 29(3). The Report must be submitted to the Director within twelve months of the date of the third test failure.

Section 30 - Monitoring - Chronic Toxicity Testing

Fathead Minnow and Ceriodaphnia dubia chronic toxicity testing is required semi-annually for the discharge effluent sampling points listed in Schedule 6 of the Regulation but only after twelve consecutive passes of both rainbow trout and Daphnia magna acute lethality tests at those points.

The intent is to require chronic toxicity testing on effluents that are non-acutely lethal to both rainbow trout and Daphnia magna. An interval of at least ninety days is required between successive sampling.

PART VII - EFFLUENT VOLUME

Section 31 - Flow Measurement

Daily flow measurements within an accuracy of ±15% are required for process and process batch effluents. For cooling water and combined effluents flow measurement accuracy must be within ± 20%.

A daily volume in cubic metres must be determined for each process, cooling water and combined effluent. A batch volume in cubic metres must be determined for each process batch effluent.

Proof of accuracy of flow measurement by calibration or certification is required within ninety days after the day on which the Regulation is filed.

New or altered flow measurement devices require proof of accuracy within two weeks after the day on which the new or altered installation is used.

Maintenance and calibration schedules for each flow measurement system must be implemented.

Section 32 - Calculation of Plant Volumes

For process, cooling water and combined effluents, daily and monthly average plant volumes discharged, in cubic metres per day, must be calculated.

PART VIII - STORM WATER CONTROL

Section 32 - Storm Water Control Study

A storm water control study, completed in accordance with the requirements of the referenced Ministry document, "Protocol for Conducting a Storm Water Control Study"[2] is required within two years after the day on which the Regulation is filed.

The study may be postponed for up to one year after limits come into force upon written notification of the Director within two years after the day on which the Regulation is filed.

A plant meeting the exemption criteria in the storm water study protocol need not comply with the study requirement provided the Director is notified in writing within one year after the day on which the Regulation is filed.

PART IX - RECORDS AND REPORTS

Section 34 - Record Keeping

Within ninety days after the day on which the Regulation is filed, each discharger must keep all records specified by the Regulation for a period of three years and upon request, make them available to the Ministry.

Specific records in electronic format are required for the following:

- daily, thrice weekly (where applicable), weekly and quarterly process effluent and process batch effluent monitoring
- pH measurement
- weekly cooling water and combined effluent monitoring including pH and specific conductance

Other records that must be kept by each discharger include:

- sampling and analytical procedures and sample pick-up information
- acute lethality and chronic toxicity test results
- flow device maintenance and calibration
- all problems or malfunctions with a potential to affect compliance
- all by-passes
- all process changes impacting the quality of the discharge
- the monthly average production in tonnes per day for each of the products listed in Schedule 7 (beginning with the first day of the month after the month in which the Regulation is filed)

The arithmetic mean of the first twelve months of the monthly average production record has been designated as the reference daily rate of production for each product listed in Schedule 7.

Section 35 - Reports Available to the Public

A report covering the environmental control performance of the plant summarized under seven specified topics listed in the Regulation, is to be prepared on or before June 1 in each year and made available to the public on request.

Section 36 - Reports to the Director - General

Notification of the Director in writing is required for the following:

- change of plant name or ownership
- any process change, redirection or change in character of an effluent that affects the quality of the effluent for a period of one week or longer
- operation for more than ninety days at less than 75% of the reference daily rate of production for any of the products shown in Schedule 7.

Section 37 - Reports to the Director - Compliance with Section 6 and Part IV

All by-passes of sampling points, all exceedances of any of the parameter limits shown in Schedule 2 and all failures to meet the regulated pH range and acute lethality limits must be reported orally to the Director as soon as is reasonably possible, and followed-up in writing as soon as is reasonably possible.

Section 38 - Quarterly Reports to the Director

Quarterly reports to the Director in electronic and hard copy are required no later than forty-five days after the end of each quarter and must provide the following information:

- a list of all exceedances of limits
- the monthly average plant loadings and plant flows and the highest and lowest daily plant loadings and plant flows for each month for limited and assessment parameters
- the highest and lowest batch loadings for each month including the number of batches discharged each month
- the monthly average and the highest and lowest daily process effluent contributions for each parameter in common with a combined effluent monitored parameter
- the number of process effluent discharge days in each month
- the highest and lowest pH readings for each month for each process effluent and batch process effluent monitoring stream
- the highest and lowest pH and specific conductance readings for each month for each cooling water and combined effluent stream

Section 39 - Reports to the Director - Chronic Toxicity Testing

When the chronic toxicity testing requirement comes into force (following twelve consecutive monthly passes of both acute lethality tests), semi-annual reports on the results of chronic toxicity testing are to be sent to the Director within forty-five days of the end of each semi-annual period. The report is to include a plot of percentage reduction in growth or reproduction and a calculation of the concentration at which 25% reduction in growth or reproduction would occur.

PART X - COMMENCEMENT AND REVOCATION PROVISIONS

Section 40 - Revocation of O. Regulation 395/89

The following ICS Regulation and its amendment are revoked on the date that is ninety days after the day on which this Regulation is filed:

- O. Reg 395/89 - filed June 30, 1989
- O. Reg 649/89 - filed November 30, 1989

Section 41 - Commencement of Parts IV, V, VI and VII

Part IV, Parameter and Lethality Limits, which requires compliance with parameter and lethality limits, comes into force on the day that is three years after the day on which the Regulation is filed.

Parts V and VI, Monitoring - Chemical Parameters/Acute Lethality and Chronic Toxicity and Part VII, Effluent Volume, requiring flow measurement, come into force ninety days after the day on which the Regulation is filed.

Schedules in the Regulation

The following seven schedules form an integral part of the Regulation:

SCHEDULE 1	-	List of Regulated Plants
SCHEDULE 2	-	Process Effluent Limits and Monitoring Frequency
SCHEDULE 3	-	Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point
SCHEDULE 4	-	Combined Effluent and Cooling Water Assessment
SCHEDULE 5	-	Designated Sampling Points for Lethality Limits
SCHEDULE 6	-	Designated Sampling Points for Chronic Toxicity Assessment
SCHEDULE 7	-	Reference Products

6.3 REFERENCES

1. Ontario Ministry of Environment and Energy, Laboratory Services Branch, "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", ISBN-0-7778-1880-9, August 1994, Queen's Printer.

2. Ontario Ministry of Environment and Energy, "Protocol for Conducting a Storm Water Control Study", ISBN-0-7778-1786-1, August 1994, Queen's Printer.

3. Environment Canada, Environmental Protection Series, "Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", Reference Method EPS 1/RM/13, July 1990, ISBN 0-662-57746-9.

4. Environment Canada, Environmental Protection Series "Reference Method for Determining Acute Lethality of Effluents to Daphnia magna", Reference Method EPS 1/RM/14, July 1990, ISBN 0-662-57747-7.

5. Environment Canada, Environmental Protection Series "Test of Larval Growth and Survival Using Fathead Minnows", Report EPS 1/RM/22, February, 1992, ISBN 0-662-19397-0.

6. Environment Canada, Environmental Protection Series "Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia", Report EPS 1/RM/21, February, 1992, ISBN 0-662-19396-2.

APPENDICES

DEVELOPMENT DOCUMENT FOR THE INORGANIC CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

APPENDIX A

SELECTION OF PARAMETERS FOR LIMITS

DEVELOPMENT DOCUMENT FOR THE INORGANIC

CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

Appendix A

Selection of Parameters for Limits

The disposition of all found parameters by control point for each plant is shown for each plant in the tables in Appendix A

Legend for Tables:

I = insufficient number of data points available to calculate a reliable variability factor

P = pass-through contaminant, i.e. not generated on-site and its presence is due solely to intake water sources

Q = deleted because of QA/QC concerns

R = parameter was found at average concentration levels which were equal to or less than the Regulation Method Detection Limit (RMDL).

S = surrogate parameter selected for this contaminant[1]

N = chemical is no longer manufactured or used as a raw material

*** = limited parameter

[1] Sector-wide surrogates:
DOC for TOC and COD
TSS for VSS
Total phenolics (4AAP) for phenol

APPENDIX A - Table A-1

Selection of Parameters for Limits

Albright and Wilson Americas

ATG	PARAMETER	LIMITED PARAMETER	CODE
4	Nitrate + Nitrite	No	P,R
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	No	P
	Strontium	No	P
	Zinc	No	P,R
12	Mercury	Yes	***
14	Phenolics (4AAP)	Yes	***
16	Chloroform	No	P
	Dibromochloromethane	No	P
25	Oil and grease	No	P,R
I1	Chloride	No	P
I2	Fluoride	No	P,R
I3	Sulphate	No	P

APPENDIX A - Table A-1

Selection of Parameters for Limits

Cabot Canada

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
2	Cyanide Total	No	R
4	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	No	R
5	DOC	Yes	***
6	Total Phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Copper	No	Q
	Strontium	No	P
	Zinc	Yes	***
15	Sulphide	No	R
24	PCDDs\PCDFs*	Yes	***
25	Oil and grease	Yes	***
I1	Chloride	No	P
I3	Sulphate	No	I

* - Added for limits on basis of MISA Inspection data

APPENDIX A - Table A-1

Selection of Parameters for Limits

Cytec Canada Inc. (Cyanamid) (Welland plant)

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
2	Cyanide Total	Yes	***
4	Ammonia plus Ammonium	Yes	***
	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	Yes	***
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	No	P
	Strontium	No	P
	Zinc	No	P,R
10	Antimony	No	P,R
	Arsenic	No	R,P
14	Phenolics (4AAP)	No	R,P
15	Sulphide	No	R,P
17	Toluene	Yes	***
24	PCDDs\PCDFs	Yes	***
25	Oil and grease	Yes	***
I1	Chloride	No	I
I2	Fluoride	No	I
I3	Sulphate	No	I

APPENDIX A - Table A-1

Selection of Parameters for Limits

The Exolon-ESK Company of Canada Ltd.

ATG	PARAMETER	LIMITED PARAMETER	CODE
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Copper	No	R
	Strontium	No	P
15	Sulphide	No	I,R
I1	Chloride	No	I
I2	Fluoride	No	R
I3	Sulphate	No	I

APPENDIX A - Table A-1

Selection of Parameters for Limits

General Chemical Canada Ltd.

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
2	Cyanide Total	Yes	***
4	Ammonia plus Ammonium	Yes	***
	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	Yes	***
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	No	P
	Beryllium	No	P,R
	Boron	No	P
	Cadmium	No	I
	Chromium	No	I
	Cobalt	No	I
	Copper	No	I
	Lead	No	QG
	Molybdenum	Yes	***
	Nickel	No	QG
	Strontium	No	P
	Thallium	No	R,I
	Vanadium	No	R,I
	Zinc	No	P
10	Antimony	No	P
	Arsenic	Yes	***
	Selenium	No	R,P
12	Mercury	Yes	***
14	Phenolics (4AAP)	No	R
15	Sulphide	Yes	***
16	1,1,2,2-Tetrachloroethane	No	R

APPENDIX A - Table A-1

Selection of Parameters for Limits

ATG	PARAMETER	LIMITED PARAMETER	CODE
16	1,1,2-Trichloroethane	No	R
	1,1-Dichloroethane	No	R
	1,2-Dichloroethane	No	R
	1,2-Dichloropropane	No	R
	Bromoform	No	R
	Bromomethane	No	R
	Chloroform	Yes	***
	Chloromethane	No	R
	Cis-1,3-Dichloropropylene	No	R
	Dibromochloromethane	No	S^1
	Ethylene dibromide	No	S^1
	Methylene chloride	No	R
	Tetrachloroethylene	No	R
	Trans-1,3-Dichloropropylene	No	R
	Trichlorofluoromethane	No	N
	Vinyl chloride	No	R
17	Benzene	No	I,R
	Styrene	No	I,R
	Toluene	No	I,R
	o-Xylene	No	I,R
18	Acrolein	No	I
	Acrylonitrile	No	R
19	Fluoranthene	No	P
	Phenathrene	No	P
	Pyrene	No	P
24	PCDDs/PCDFs	Yes	***
25	Oil and grease	Yes	***
I1	Chloride	Yes	***
I2	Fluoride	Yes	***
I3	Sulphate	Yes	***

NOTE: "S^1" = Chloroform used as surrogate parameter
"QG" = Analytical Interference due to high chloride levels

APPENDIX A - Table A-1

Selection of Parameters for Limits

ICI Canada Inc. (Cornwall)

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
2	Cyanide Total	No	P,I,R
4	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	No	R,P
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
	Volatile suspended solids	No	S
9	Aluminum	Yes	***
	Berylium	No	P,R
	Boron	No	P
	Cadmium	No	R,P
	Chromium	No	R
	Cobalt	No	R
	Copper	Yes	***
	Lead	Yes	***
	Molybdenum	No	P,R
	Nickel	Yes	***
	Strontium	No	P
	Thallium	No	P,R
	Vanadium	No	P
	Zinc	Yes	***
10	Arsenic	Yes	***
11	Chromium (hexavalent)	No	R
12	Mercury	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

ATG	PARAMETER	LIMITED PARAMETER	CODE
14	Phenolics (4AAP)	Yes	***
15	Sulphide	No	R
16	1,2-Dichloroethane	No	R,P
	Chloroform	No	I
	Dibromochloromethane	No	R
	Methylene chloride	No	I
19	Bis(2-ethylhexyl)phthalate	No	I
	Di-n-butylphthalate	No	I
23	1,2,3,4-Tetrachlorobenzene	No	R
	1,2,3,5-Tetrachlorobenzene	No	R
	1,2,3-Trichlorobenzene	No	R
	1,2,4,5-Tetrachlorobenzene	No	R
	1,2,4-Trichlorobenzene	Yes	***
	2,4,5-Trichlorotoluene	No	R
	Hexachlorobenzene	Yes	***
	Hexachlorobutadiene	Yes	***
	Hexachlorocyclopentadiene	No	Q
	Hexachloroethane	Yes	***
	Octachlorostryene	Yes	***
	Pentachlorobenzene	Yes	***
24	PCDDs/PCDFs	Yes	***
25	Oil and grease	Yes	***
27	PCBT	No	I
I1	Chloride	No	I
I2	Fluoride	No	I
I3	Sulphate	No	I

APPENDIX A - Table A-1

Selection of Parameters for Limits

ICI Canada Inc. - Conpak

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
4	Ammonia plus Ammonium	Yes	***
	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	Yes	***
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Beryllium	No	P,R
	Boron	No	P
	Cadmium	Yes	***
	Chromium	Yes	***
	Copper	Yes	***
	Lead	Yes	***
	Molybdenum	No	P,R
	Nickel	Yes	***
	Strontium	No	P
	Thallium	No	P,R
	Vanadium	No	P,R
	Zinc	Yes	***
10	Antimony	Yes	***
	Arsenic	Yes	***
	Selenium	Yes	***
11	Chromium (hexavalent)	No	R
12	Mercury	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

ATG	PARAMETER	LIMITED PARAMETER	CODE
14	Phenolics (4AAP)	Yes	***
16	Carbon tetrachloride	Yes	***
	Chloroform	Yes	***
	Dibromochloromethane	No	P,R
	Tetrachloroethylene	No	P,R
17	Benzene	No	I
19	Benzylbutylphthalate	No	I
	Bis(2-ethylhexyl)phthalate	No	I
	Di-n-butylphthalate	No	I
23	1,2,3,4-Tetrachlorobenzene	No	R
	1,2,3,5-Tetrachlorobenzene	No	R
	1,2,3-Trichlorobenzene	Yes	***
	1,2,4,5-Tetrachlorobenzene	No	R
	1,2,4-Trichlorobenzene	Yes	***
	2,4,5-Trichlorotoluene	No	R
	Hexachlorobenzene	Yes	***
	Hexachlorobutadiene	Yes	***
	Hexachlorocyclopentadiene	No	R,P
	Hexachloroethane	Yes	***
	Octachlorostyrene	No	R
	Pentachlorobenzene	No	R
24	PCDDs/PCDFs	Yes	***
25	Oil and grease	Yes	***
I1	Chloride	Yes	***
I2	Fluoride	No	I
I3	Sulphate	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

International Minerals and Chemicals Corporation (Canada) Ltd.

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
4	Ammonia plus Ammonium	Yes	***
	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	Yes	***
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	No	R
	Boron	No	R,P
	Strontium	No	P
	Zinc	No	R
14	Phenolics (4AAP)	Yes	***
15	Sulphide	No	R,I
25	Oil and grease	Yes	***
I1	Chloride	No	I
I2	Fluoride	Yes	***
I3	Sulphate	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

Liquid Carbonic Inc.(Courtright)

ATG	PARAMETER	LIMITED PARAMETER	CODE
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Boron	No	P
	Strontium	No	P
	Zinc	No	R,I
25	Oil and grease	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

Liquid Carbonic Inc.(Maitland)

ATG	PARAMETER	LIMITED PARAMETER	CODE
4	Ammonia plus Ammonium	No	S
	Nitrate + Nitrite	Yes	***
	Total Kjeldahl nitrogen	No	S
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	No	P
	Boron	No	P
	Strontium	No	P
	Zinc	No	P
25	Oil and grease	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

Norton Advanced Ceramics of Canada Inc.

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
4	Ammonia plus Ammonium	No	R
	Nitrate + Nitrite	No	R
	Total Kjeldahl Nitrogen	No	R
5	DOC	Yes	***
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Boron	No	P
	Chromium	No	R,P
	Copper	No	R,P
	Strontium	No	P
	Zinc	No	R,P
12	Mercury	No	R
16	Chloroform	No	R,P
	Methylene chloride	No	P
	1,3-Dichlorobenzene	No	P
	1,4-Dichlorobenzene	No	R
19	Bis(2-ethylhexyl)phthalate	No	I
25	Oil and grease	Yes	***
I1	Chloride	No	P
I2	Fluoride	No	R,P
I3	Sulphate	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

Nutrite Inc.

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
2	Cyanide Total	No	I
4	Ammonia plus Ammonium	Yes	***
	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	Yes	***
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
	Volatile suspended solids	No	S
9	Aluminum	Yes	***
	Boron	No	P
	Copper	Yes	***
	Strontium	No	P
	Vanadium	Yes	***
	Zinc	Yes	***
12	Mercury	Yes	***
14	Phenolics (4AAP)	Yes	***
15	Sulphide	No	I
16	1,1-Dichloroethane	No	R
	1,1-Dichloroethylene	No	R
	Bromoform	No	R
	Chloroform	No	S
	Tetrachloroethylene	Yes	***
	Trans-1,2-Dichloroethylene	No	S
	Trichloroethylene	No	R
20	Phenol	No	S

APPENDIX A - Table A-1

Selection of Parameters for Limits

ATG	PARAMETER	LIMITED PARAMETER	CODE
24	PCDDs/PCDFs	Yes	***
25	Oil and grease	Yes	***
27	PCBT	Yes	***
I1	Chloride	No	I
I2	Fluoride	No	R
I3	Sulphate	No	I

APPENDIX A - Table A-1

Selection of Parameters for Limits

Praxair Canada Inc. (Mooretown)

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
4	Nitrate + Nitrite	No	I
	Total Kjeldahl Nitrogen	No	I
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Boron	No	P
	Chromium	No	R
	Copper	Yes	***
	Strontium	No	P
	Zinc	Yes	***
10	Arsenic	No	I
16	Bromoform	No	I
	Methylene chloride	No	P
19	Bis(2-ethylhexyl)phthalate	No	I
24	PCDDs\PCDFs	Yes	***
25	Oil and grease	Yes	***
I1	Chloride	No	I
I2	Fluoride	No	I
I3	Sulphate	No	I

APPENDIX A - Table A-1

Selection of Parameters for Limits

Praxair Canada Inc. (Sarnia)

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
4	Ammonia plus Ammonium	No	R,I
	Nitrate + Nitrite	No	I
	Total Kjeldahl Nitrogen	No	I
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Boron	No	P
	Copper	Yes	***
	Strontium	No	P
	Zinc	Yes	***
10	Arsenic	No	R,I
19	Bis(2-ethylhexyl)phthalate	No	I
24	PCDDs/PCDFs	Yes	***
25	Oil and grease	Yes	***
I1	Chloride	No	I
I2	Fluoride	No	I
I3	Sulphate	No	I

APPENDIX A - Table A-1

Selection of Parameters for Limits

Praxair Canada Inc.
(Sault Ste. Marie)

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
4	Nitrate + Nitrite	No	I
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
	Volatile suspended solids	No	S
9	Aluminum	Yes	***
	Boron	No	P
	Copper	Yes	***
	Strontium	No	P
	Zinc	Yes	***
16	Chloroform	No	I
	Methylene chloride	No	I
	1,3-Dichlorobenzene	No	R
	1,4-Dichlorobenzene	No	R
24	PCDDs/PCDFs	Yes	***
25	Oil and grease	Yes	***
I1	Chloride	No	I
I3	Sulphate	No	I

APPENDIX A - Table A-1

Selection of Parameters for Limits

Puritan-Bennett Corporation

ATG	PARAMETER	LIMITED PARAMETER	CODE
4	Ammonia plus Ammonium	Yes	***
	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	Yes	***
5	DOC	Yes	***
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

Sulco Chemicals Ltd.

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
2	Cyanide Total	Yes	***
4	Ammonia plus Ammonium	No	R
	Nitrate + Nitrite	No	P
	Total Kjeldahl Nitrogen	No	R,P
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Boron	No	P
	Cadmium	Yes	***
	Cobalt	No	R
	Copper	Yes	***
	Lead	No	R
	Nickel	Yes	***
	Strontium	No	P
	Vanadium	Yes	***
	Zinc	Yes	***
10	Arsenic	Yes	***
14	Phenolics (4AAP)	Yes	***
15	Sulphide	No	R
19	Benzylbutylphthalate	No	R
	Bis(2-ethylhexyl)phthalate	No	R
25	Oil and grease	Yes	***
I1	Chloride	Yes	***
I2	Fluoride	Yes	***
I3	Sulphate	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

Terra Industries (Canada) Inc.

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
2	Cyanide Total	No	R,P
4	Ammonia plus Ammonium	Yes	***
	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	Yes	***
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Copper	No	P
	Strontium	No	P
	Zinc	Yes	***
14	Phenolics (4AAP)	Yes	***
16	Chloroform	No	P
	Chloromethane	No	P
19	Benzylbutylphthalate	No	R
	Bis(2-ethylhexyl)phthalate	No	R
	Diphenyl either	No	R
20	Phenol	No	S
I1	Chloride	No	P
I2	Fluoride	Yes	***
I3	Sulphate	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

UCAR Carbon Canada Inc.

ATG	PARAMETER	LIMITED PARAMETER	CODE
4	Nitrate + Nitrite	Yes	***
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Boron	No	P
	Strontium	No	P
	Zinc	Yes	***
14	Phenolics (4AAP)	Yes	***
25	Oil and grease	Yes	***
I1	Chloride	Yes	***
I2	Fluoride	No	I
I3	Sulphate	Yes	***

APPENDIX A - Table A-1

Selection of Parameters for Limits

Washington Mills Ltd.

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
4	Ammonia plus Ammonium	No	I
	Total Kjeldahl Nitrogen	No	I
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Boron	No	P
	Strontium	No	P
14	Phenolics (4AAP)	No	I,R
15	Sulphide	No	I
25	Oil and grease	Yes	***
I1	Chloride	No	N
I2	Fluoride	No	I
I3	Sulphate	No	N

APPENDIX A - Table A-1

Selection of Parameters for Limits

Washington Mills Electro Minerals Corporation

ATG	PARAMETER	LIMITED PARAMETER	CODE
5	DOC	Yes	***
	TOC	No	S
6	Total phosphorus	Yes	***
8	Total suspended solids	Yes	***
9	Aluminum	Yes	***
	Strontium	No	P
14	Phenolics (4AAP)	No	R
19	Bis(2-ethylhexyl)phthalate	No	R
25	Oil and Grease	Yes	***
I1	Chloride	No	I
I3	Sulphate	No	I

APPENDIX A - Table A-1

Selection of Parameters for Limits

Welland Chemical Limited

ATG	PARAMETER	LIMITED PARAMETER	CODE
1	COD	No	S
4	Ammonia plus Ammonium	No	N,I
	Nitrate + Nitrite	Yes	***
	Total Kjeldahl Nitrogen	No	I
5	DOC	Yes	***
	TOC	No	S
6	Total Phosphorus	Yes	***
8	Total suspended solids	Yes	***
	Volatile suspended solids	No	S
9	Aluminum	Yes	***
	Boron	No	I,P
	Cadmium	No	R
	Strontium	No	P
	Zinc	No	R
14	Phenolics (4AAP)	No	I
15	Sulphide	No	I
16	Chloroform	Yes	***
	Dibromochloromethane	No	R
	Methylene chloride	No	R
17	o-Xylene	No	R,I
19	Bis(2-ethylhexyl)phthalate	No	R
	Di-n-butylphthalate	No	R
23	Hexachlorobenzene	No	R,I
	Pentachlorobenzene	No	R,I
25	Oil and grease	No	R,I
I1	Chloride	No	I
I2	Fluoride	No	R
I3	Sulphate	No	I

APPENDIX B

PERFORMANCE VALUES

DEVELOPMENT DOCUMENT FOR THE INORGANIC

CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

Appendix B - Summary of Current (1989-90 Monitoring Data) Versus BAT 4 Performance Data

Legend for Codes - Performance Data Tables

ATG	= analytical test group
Freq	= monitoring frequency d = daily w = weekly q = quarterly b = batch
RMDL	= regulation method detection limit
CLTA	= long term average concentration
LLTA	= long term average loading (kg./day)
LVF1	= daily loading variability factor
LVFML	= monthly loading variability factor
LDAYL	= daily maximum loading value (kg./day)
LML	= monthly average loading value (kg./day)
CDAYL	= concentration equivalent of LDAYL
CML	= concentration equivalent of LML

Note:

In cases where the final monitoring frequency assigned for a parameter in the regulation is quarterly, no monthly average limit can be calculated and therefore in the regulation schedules these parameters will have no values listed under column 4 of Schedule 2.

Appendix B

Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

Albright & Wilson Americas Inc., Port Maitland – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	3.39	20.9	w	3.39	20.9	10.1	1.41	211	· 29.5	34.9	4.87
6	Total phosphorus	0.1	mg/L	0.081	0.484	d	0.1	0.61	3.87	1.53	2.36	0.933	0.4	0.15
8	Total suspended solids	5	mg/L	4.45	26.7	d	5	30.3	5.68	1.57	172	47.5	28.4	7.8
12	Mercury	0.1	ug/L	0.126	0.00077	q	0.126	0.00077	3.28	1.6	0.00253	0.00123	0.418	0.203
14	Phenolics (4AAP)	2	ug/L	3.83	0.024	w	3.83	0.024	5.03	2	0.121	0.048	20	7.93
	Flow		m3/d	6050		d	6050							

Cabot Canada Ltd., Sarnia – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Nitrate+Nitrite	0.25	mg/L	0.605	1.12	q	0.605	1.12	2.89	1.51	3.24	1.69	1.5	0.78
5	DOC	0.5	mg/L	3.05	5.96	w	3.05	5.96	4.87	1.71	29	10.2	13.3	4.7
6	Total phosphorus	0.1	mg/L	0.086	0.175	q	0.1	0.218	–	–	0.872	0.436	0.4	0.2
8	Total suspended solids	5	mg/L	4.89	10.9	d	5	10.9	4.43	1.35	48.3	14.7	22.2	6.7
9	Aluminum	30	ug/L	661	1.39	w	661	1.39	2.54	1.56	3.53	2.17	1600	1000
9	Zinc	10	ug/L	73.6	0.135	q	73.6	0.135	10	1.4	1.35	0.189	620	87
25	Oil and grease	1	mg/L	1.36	3.14	q	1.36	3.14	5.48	2.01	17.2	6.31	8	2.9
	Flow		m3/d	2180		d	2180							

Cytec Canada Inc., Welland – 0400

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
2	Cyanide Total	0.005	mg/L	0.204	1.05	w	0.03	0.03	4.31	1.9	0.129	0.05	0.129	0.05
4	Ammonia plus Ammonium	0.25	mg/L	16.8	57.4	w	2	2	5.09	1.7	10.2	3.4	10.2	3.4
4	Nitrate+Nitrite	0.25	mg/L	13.7	69.7	w	4.6	4.6	7.05	2.21	32.4	10.2	32.4	10.166
4	Total Kjeldahl nitrogen	0.5	mg/L	64.1	258	w	2	2	4.83	1.78	9.66	3.56	9.66	3.6
5	DOC	0.5	mg/L	28.5	117	w	16.7	16.7	4.46	1.63	74.5	27.2	74.5	27.2
6	Total phosphorus	0.1	mg/L	2.63	10.6	d	1	1	4.95	1.94	4.95	1.94	4.9	1.9
8	Total suspended solids	5	mg/L	32.7	255	d	15	15	20.2	4.14	*150	20.7	150	20.7
17	Toluene	0.5	ug/L	2.11	0.012	w	12	0.012	15	3.86	*0.12	0.046	120	46
25	Oil and grease	1	mg/L	1.47	8.65	q	1.1	1.1	7.65	2.52	8.42	2.77	8.42	2.772
	Flow		m3/d	7380		d	1000							

* – Values based on LVF1 of 10

Appendix B   Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

Exolon–Esk Conpany of Canada ltd. , Niagara Falls – 0100

				CURRENT		BAT#4								
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	3.3	33.2	w	3.3	9.45	10.5	1.48	99.2	14	34.6	4.87
6	Total phosphorus	0.1	mg/L	0.137	1.39	w	0.1	0.287	19.6	3.45	*2.87	0.99	1.0	0.345
8	Total suspended solids	5	mg/L	19	184	d	19	54.4	2.88	1.46	157	79.4	54.6	27.7
9	Aluminum	30	ug/L	284	2.74	w	284	0.814	3.14	1.32	2.56	1.07	891	374
	Flow		m3/d	9550		d	2870							

* – Values based on LVF1 of 10

General Chemical Canada Ltd. , Amherstburg – 0100

				CURRENT		BAT#4								
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Ammonia plus Ammonium	0.25	mg/L	5.44	80.1	w	2	32.1	6.46	1.62	208	52.1	12.9	3.2
4	Total Kjeldahl nitrogen	0.5	mg/L	5.87	90	w	2	32.1	1.81	1.28	58.2	41.1	3.6	2.6
5	DOC	0.5	mg/L	221	3530	w	16.7	280	5.54	2.09	1551	585	96.5	36.4
6	Total phosphorus	0.1	mg/L	0.237	3.42	q	0.237	3.59	3.23	1.54	11.6	5.53	0.722	0.344
8	Total suspended solids	5	mg/L	41.4	629	d	41.4	661	4.44	1.73	2935	1144	183	71.2
9	Molybdenum	20	ug/L	167	3.22	q	167	3.38	3	1.64	10.1	5.54	629	345
10	Arsenic	5	ug/L	18.7	0.297	q	18.7	0.312	6.22	2.24	1.94	0.7	121	43.6
12	Mercury	0.1	ug/L	0.203	0.003	q	0.203	0.00315	5.04	1.95	0.0159	0.00614	1	0.382
15	Sulphide	20	ug/L	50.1	0.731	q	50.1	0.768	8.26	2.66	6.34	2.04	395	127
16	Chloroform	0.7	ug/L	2.23	0.04	q	2.23	0.042	5.59	2.09	0.235	0.0878	14.6	5.47
25	Oil and grease	1	mg/L	1.4	21.9	q	1.4	23	4.62	1.83	106	42.1	6.6	2.62
11	Chloride	2	mg/L	47,900	730,000	w	47,900	766,500	1.43	1.2	1,096,100	919,800	68,230	57,260
12	Fluoride	0.1	mg/L	2.17	33.8	w	2.17	35.5	1.68	1.3	59.6	46.2	3.71	2.88
13	Sulphate	5	mg/L	1,160	17,800	w	1,160	18,690	1.6	1.21	29,900	22,620	1,861	1,408
	Flow		m3/d	15,300		d	16,065							

Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

General Chemical Canada Ltd. , Amherstburg – 0200

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
2	Cyanide Total	0.005	mg/L	0.012	2.44	q	0.012	2.64	2.4	1.39	6.3	3.7	0.029	0.017
4	Ammonia plus Ammonium	0.25	mg/L	2.97	586	w	2	440	6.12	1.37	2700	602	12.3	2.7
4	Nitrate+Nitrite	0.25	mg/L	1.15	228	q	1.15	253	2.96	1.5	749	380	3.4	1.72
4	Total Kjeldahl nitrogen	0.5	mg/L	3.28	652	w	2	440	5.27	1.92	2320	844	10.6	3.8
5	DOC	0.5	mg/L	2.19	445	w	2.19	500	2.63	1.27	1300	635	5.9	2.89
6	Total phosphorus	0.1	mg/L	0.11	22.4	q	0.11	24.2	2.16	1.26	52.3	30.5	0.24	0.14
8	Total suspended solids	5	mg/L	28.2	5950	d	28.2	6200	6.41	1.5	39700	9300	181	42.3
25	Oil and grease	1	mg/L	1.29	265	q	1.29	296	4.32	1.74	1280	515	5.8	2.34
11	Chloride	2	mg/L	99.1	19800	w	99.1	21800	2.64	1.3	57600	28300	262	129
13	Sulphate	5	mg/L	23.2	4710	w	23.2	5100	1.34	1.07	6830	5460	31.1	24.8
	Flow		m3/d	209000		d	220000							

ICI Canada Inc. , Cornwall – 0400

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Nitrate+Nitrite	0.25	mg/L	0.444	0.094	q	0.444	0.094	9.61	1.43	0.903	0.134	3.94	0.587
5	DOC	0.5	mg/L	11.7	2.42	w	11.7	2.42	3.98	1.74	9.63	4.21	42.1	18.4
6	Totel phosphorus	0.1	mg/L	0.715	0.163	q	0.715	0.163	6.52	2.3	1.06	0.375	4.64	1.64
8	Total suspended solids	5	mg/L	.603	153	d	15	2.4	11.9	1.8	*24	4.3	150	27
9	Lead	30	ug/L	150	0.036	q	113	0.018	12.6	3.58	0.23	0.064	1440	400
9	Nickel	20	ug/L	26	0.005	q	16	0.0025	4.89	1.94	0.01	0.0097	63	16
9	Zinc	10	ug/L	97	0.02	q	63	0.01	5.55	1.38	0.056	0.014	350	86
9	Copper	10	ug/L	26.4	0.005	q	15.6	0.0025	6.5	2.28	0.016	0.006	100	38
9	Aluminum	30	ug/L	505	0.103	w	319	0.051	8.34	1.53	0.43	0.078	2690	490
10	Arsenic	5	ug/L	7.5	0.002	q	6.2	0.001	4.6	1.87	0.005	0.002	31	13
12	Mercury	0.1	ug/L	139	0.021	d	5	0.0008	7.29	1.45	0.0058	0.0012	36.3	7.5
14	Phenolics (4AAP)	2	ug/L	4.54	0.001	q	4.54	0.0007	5.93	2.14	0.0042	0.0015	263	9.4
23	1,2,4–Trichlorobenzene	10	ng/L	294	0.00007	w	213	0.00003	15.3	3.73	*0.00034	0.00013	2100	800
23	Hexachlorobenzene	10	ng/L	136	0.00003	w	100	0.00002	11.6	3.45	*0.00016	0.00006	1000	300
23	Hexachlorobutadiene	10	ng/L	249	0.00006	w	181	0.00003	11.4	3.4	0.00029	0.0001	1800	600
23	Hexachloroethane	10	ng/L	949	0.00022	w	681	0.00011	12.7	3.7	*0.0011	0.0004	6800	2500
23	Octachlorostyrene	10	ng/L	56.2	0.00001	q	44	7E–06	10.1	3.07	0.000071	0.00002	400	100
23	Pentachlorobenzene	10	ng/L	80.8	0.00002	q	63	0.00001	11.3	3.39	*0.0001	0.00003	600	100
25	Oil and grease	1	mg/L	9.15	1.9	q	3.3	0.756	8.82	2.81	6.67	2.12	29.1	9.28
	Ftflow		m3/d	229		d	160							

* – Values based on LVF1 of 10

Appendix B **Summary of Current (89−90 monitoring data) versus BAT 4 Performance Data**

ICI Canada Inc. − Conpak, Cornwall − 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Ammonia plus Ammonium	0.25	mg/L	49.5	1.41	w	2	0.029	11.8	3.52	*0.29	0.1	20	6.8
4	Nitrate+Nitrite	0.25	mg/L	56.9	1.83	w	4.6	0.068	28.6	2.18	*0.68	0.15	46	10
4	Total Kjeldahl nitrogen	0.5	mg/L	34.9	1.09	w	2	0.029	13	3.76	*0.29	0.11	20	7.4
5	DOC	0.5	mg/L	52.1	2.36	w	10.1	0.149	9.57	2.04	1.43	0.304	96.3	21
6	Total phosphorus	0.1	mg/L	6.63	0.252	w	1	0.015	15.3	1.51	*0.15	0.023	10	1.5
8	Total suspended solids	5	mg/L	83.4	3.2	d	8.3	0.32	10.9	1.86	3.49	0.595	236	40.2
9	Aluminum	30	ug/L	379	0.014	w	379	0.014	9.71	1.54	0.136	0.022	9200	1500
9	Cadmium	2	ug/L	24	0.00075	w	3	0.00004	8.62	1.6	0.00024	0.00006	23	4
9	Chromium	20	ug/L	75.8	0.003	w	75.8	0.003	9.66	1.54	0.029	0.0046	1960	312
9	Copper	10	ug/L	679	0.027	w	48	0.00071	11.7	1.85	*0.0071	0.0012	480	89
9	Lead	30	ug/L	728	0.028	w	125	0.0013	10.6	1.39	0.0138	0.00181	1380	181
9	Nickel	20	ug/L	239	0.008	w	60	0.00063	13.2	1.82	*0.063	0.00115	630	115
9	Zinc	10	ug/L	187	0.007	w	200	0.00013	7.33	1.59	0.000977	0.00021	97.7	21.2
10	Antimony	5	ug/L	3.42	0.00011	w	3.42	0.00004	4.81	1.91	0.000172	0.00007	17.2	6.8
10	Arsenic	5	ug/L	6.15	0.00019	q	6.15	0.00006	11.1	3.29	*0.0006	0.00021	600	21.2
10	Selenium	5	ug/L	13.8	0.00043	q	13.8	0.00014	12.4	3.58	*0.0014	0.00052	140	51.7
12	Mercury	0.1	ug/L	3.15	0.0001	w	3.15	0.00003	23.5	1.93	*0.0003	0.00006	30	6.37
14	Phenolics (4AAP)	2	ug/L	10.4	0.00033	w	10.4	0.00011	5.79	1.53	0.00063	0.00017	63	16.7
16	Carbon tetrachloride	1.3	ug/L	27.9	0.00088	w	27.9	0.00029	14.1	3.81	*0.0029	0.00111	290	111
16	Chloroform	0.7	ug/L	49.4	0.00155	w	7.5	0.00008	23.6	2.03	0.0008	0.00016	80	16
23	1,2,3−Trichlorobenzene	10	ng/L	52.1	2E−06	q	52.1	5E−07	8.12	2.65	4.4E−06	1E−06	443	145
23	1,2,4−Trichlorobenzene	10	ng/L	47.4	1E−06	q	47.4	5E−07	6.64	2.33	3.3E−06	1E−06	330	116
23	Hexachlorobenzene	10	ng/L	404	0.00001	w	404	4E−06	9.05	2.88	0.000038	0.00001	3830	1220
23	Hexachlorobutadiene	10	ng/L	42.5	1E−06	q	42.5	4E−07	10.5	3.23	4.7E−06	1E−06	467	143
23	Hexachloroethane	10	ng/L	1690	0.00005	w	1690	0.00002	13.5	3.81	*0.0002	0.00007	20000	6730
25	Oil and grease	1	mg/L	2.88	0.099	q	2.88	0.1	6.84	1.65	0.684	0.165	46.2	11.1
11	Chloride	2	mg/L	1380	50.2	w	1380	16.7	15.3	2.55	*167	42.7	16700	4270
13	Sulphate	5	mg/L	982	35.5	w	982	11.8	10.2	1.55	121	18.3	12100	1830
	Flow		m3/d	31.4		d	10							

* − Values based on LVF1 of 10

Appendix B — Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

International Minerals and Chemicals Ltd., Port Maitland – 0300

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Ammonia plus Ammonium	0.25	mg/L	1.09	3.07	q	1.09	5.4	7.5	1.72	41	9.2	8.05	1.85
4	Nitrate+Nitrite	0.25	mg/L	0.757	2.13	q	0.757	3.7	6.7	1.73	25	6.4	4.99	1.29
4	Total Kjeldahl nitrogen	0.5	mg/L	1.65	4.71	q	1.65	8.2	3.61	1.3	30	11	5.95	2.14
5	DOC	0.5	mg/L	7.6	20.5	q	7.6	38	1.78	1.23	68	47	13.6	9.4
6	Total phosphorus	0.1	mg/L	0.645	1.87	d	0.645	3.3	2.43	1.38	7.9	4.5	1.59	0.902
8	Total suspended solids	5	mg/L	7.76	22.3	d	7.76	39	2.66	1.29	*253	51	51	10.1
14	Phenolics (4AAP)	2	ug/L	8.75	0.02	q	8.75	0.035	4.69	1.97	0.16	0.07	32.8	13.8
25	Oil and grease	1	mg/L	1.06	3.05	q	1.06	5.3	1.88	1.21	10	6.5	2	1.29
12	Fluoride	0.1	mg/L	9.48	27.1	d	9.48	47.3	1.6	1.21	76	57	15.2	11.5
13	Sulphate	5	mg/L	1690	4830	q	1690	8440	1.48	1.15	12540	9690	2500	1940
	Flow		m3/d	2860		d	5000							

* – LVF1 of 6.5 used to account for effect of wind on settling

Liquid Carbonic Inc., Courtright – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	5.79	29.1	w	5.79	29.1	10.7	2.55	311	74.2	64.1	15.3
6	Total phosphorus	0.1	mg/L	0.019	0.101	q	0.019	0.101	–	–	1.94	0.972	0.4	0.2
8	Total suspended solids	5	mg/L	2.93	14.1	d	2.93	14.1	–	–	97.2	48.6	20	10
9	Aluminum	30	ug/L	63.5	0.32	w	63.5	0.32	4.91	1.95	1.57	0.624	323	128
25	Oil and grease	1	mg/L	2.52	11.5	w	2.52	11.5	6.7	2.32	77.1	26.7	15.9	5.49
	Flow		m3/d	4860		d	4860							

Liquid Carbonic Inc., Maitland – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Nitrate + Nitrite	0.25	mg/L	3.9	9	w	4.6	10	2.34	1.47	21.8	14.7	10	6.8
5	DOC	0.5	mg/L	8.02	18	w	8.02	18	10.5	2.53	190	45.5	87.2	20.9
6	Total phosphorus	0.1	mg/L	0.064	0.162	q	0.064	0.162	4	2	0.87	0.44	0.4	10
8	Total suspended solids	5	mg/L	1.32	2.86	w	1.32	2.86	4	2	43.6	21.8	20	10
25	Oil and grease	1	mg/L	2.88	5.95	w	2.88	5.95	5.92	2.19	35.2	13	16.1	5.98
	Flow		m3/d	2180		d	2180							

Appendix B — Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

Norton Advanced Ceramics of Canada Inc. , Niagara Falls – 0300

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	2.01	3.97	w	2.01	3.97	3.58	1.65	14.2	6.55	7.21	3.33
6	Total phosphorus	0.1	mg/L	0.057	0.122	q	0.057	0.122	–	–	0.788	0.394	0.4	0.2
8	Total suspended solids	5	mg/L	18.8	36.1	d	10.2	20.1	5.79	1.45	116	29.1	59	14.8
9	Aluminum	30	ug/L	2150	4.23	w	470	0.926	7.1	1.46	6.57	1.35	3340	686
25	Oil and grease	1	mg/L	1.43	2.8	q	1	1.97	4.33	1.77	8.53	3.49	4.33	1.77
13	Sulphate	5	mg/L	237	511	w	237	511	3.63	1.49	1870	767	949	390
	Flow		m3/d	1970		d	1970							

Norton Advanced Ceramics of Canada Inc. , Niagara Falls – 0400

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	2.07	8.18	w	2.07	8.18	2.37	1.14	19.4	9.33	4.79	2.3
6	Total phosphorus	0.1	mg/L	0.034	0.128	q	0.034	0.128	–	–	1.62	0.81	0.4	0.2
8	Total suspended solids	5	mg/L	12.4	46	d	10.2	41.3	7.96	1.77	329	73.1	81.2	18.1
9	Aluminum	30	ug/L	1140	4.23	w	470	1.91	4.24	1.34	8.1	2.56	2000	632
25	Oil and grease	1	mg/L	1.71	6.85	q	1	4.05	3.92	1.71	15.9	6.93	3.92	1.71
	Flow		m3/d	4050		d	4050							

Appendix B — Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

Nutrite Inc. , Maitland – 0400

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Ammonia plus Ammonium	0.25	mg/L	112	89.5	d	2	1.6	9.79	1.53	15.8	2.46	19.6	3
4	Nitrate+Nitrite	0.25	mg/L	92.4	74	d	4.6	3.68	11.3	1.6	**36.8	5.9	46.1	7.36
4	Total Kjeldahl nitrogen	0.5	mg/L	122	97.5	d	2	1.6	9.79	1.55	15.7	1.33	19.5	3.1
5	DOC	0.5	mg/L	32.5	26	w	8.61	6.9	3.04	1.54	21	10.7	26.2	13.3
6	Totel phosphorus	0.1	mg/L	1.36	1.09	w	1.36	1.09	7.19	1.46	7.85	*0.798	9.8	1
8	Total suspended solids	5	mg/L	199	159	d	5	4	10.6	2.25	42.4	9	53	11.3
9	Aluminum	30	ug/L	594	0.475	w	206	0.165	9.39	1.67	1.6	0.28	1940	344
9	Copper	10	ug/L	56.3	0.045	q	25.3	0.02	4.88	1.29	0.1	0.026	124	32.7
9	Vanadium	30	ug/L	200	0.16	q	132	0.11	8.17	1.54	0.86	0.163	1080	203
9	Zinc	10	ug/L	52.9	0.0425	w	18.5	0.015	6.74	1.42	0.1	0.021	125	26.3
12	Mercury	0.1	ug/L	0.168	0.00014	q	0.168	0.00013	3.32	1.25	0.000447	0.00017	0.558	0.21
14	Phenolics (4AAP)	2	ug/L	85.5	0.0685	w	2	0.0016	3.94	1.73	0.0063	0.0027	7.88	3.46
16	Tetrachloroethylene	1.1	ug/L	44.5	0.0355	q	44.5	0.036	3.18	1.58	0.11	0.056	142	70.3
25	Oil and grease	1	mg/L	20.4	16.3	w	2.63	2.1	41.6	6	***8.67	***3.65	10.9	4.5
27	PCBT	0.1	ug/L	0.377	0.0003	q	0.1	0.00008	27.8	5.73	+0.0003	+0.0002	0.4	0.2
	Flow		m3/d	798		d	798							

* – Values based on CML of 1.0 mg/L

** – Values based on LVF1 of 10

*** – Values calculated using average LVF's of 4.13 and 1.74 for Oil and Grease from Norton Advanced Ceramics of Canada Inc. , Niagara Falls – 0300

+ – Values based on CDAYL of 4RMDL and CML of 2RMDL

Appendix B Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

Praxair Canada Inc. , Moore – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	9.84	0.11	w	9.84	0.11	13.4	1.52	*1.12	0.17	97.8	14.9
6	Total phosphorus	0.1	mg/L	0.923	0.0095	w	0.923	0.0095	13.1	1.53	*0.095	0.0145	8.3	1.27
8	Total suspended solids	5	mg/L	8.78	0.1	d	8.78	0.1	9.03	1.51	0.9	0.143	79	12.5
9	Aluminum	30	ug/L	303	0.0024	w	303	0.0024	5.93	2.17	0.0142	0.0052	1245	456
9	Copper	10	ug/L	45.8	0.0005	q	45.8	0.0005	7.53	2.7	0.0038	0.0014	330	118
9	Zinc	10	ug/L	121	0.002	w	121	0.002	9.78	3.28	0.0196	0.0066	1719	578
25	Oil and grease	1	mg/L	2.48	0.0285	w	2.48	0.0285	3.77	1.65	0.107	0.047	9.43	4.13
	Flow		m3/d	11.4		d	11.4							

* – Values based on LVF1 of 10

Praxair Canada Inc. , Sarnia – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	10.6	0.22	w	9.84	0.342	3.78	1.21	1.3	0.417	36.4	11.9
6	Total phosphorus	0.1	mg/L	1.06	0.02	w	0.923	0.0323	7.29	1.31	0.236	0.043	6.73	1.22
8	Total suspended solids	5	mg/L	10.5	0.22	d	8.78	0.307	14.5	4.28	*2.78	*0.464	79.5	13.3
9	Aluminum	30	ug/L	281	0.006	w	281	0.0099	8	2.65	*0.058	*0.0222	1660	634
9	Copper	10	ug/L	134	0.003	w	45.8	0.0017	4.13	1.78	0.007	0.0031	200	88
9	Zinc	10	ug/L	454	0.009	w	121	0.0043	3	1.53	0.0128	0.0065	366	185
25	Oil and grease	1	mg/L	2.51	0.05	w	2.48	0.0871	5.36	2.04	*0.328	*0.143	9.4	4.1
	Flow		m3/d	20.5		d	35							

* – Variability Factors for Praxair Canada Inc. , Moore

Praxair Canada Inc. , Ste. St. Marie – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	9.55	2.52	w	9.55	2.38	13.7	3.92	**9	**2.9	36.1	11.6
6	Total phosphorus	0.1	mg/L	1.07	0.268	w	0.923	0.23	15.1	3.77	**1.68	**0.3	6.75	1.2
8	Total suspended solids	5	mg/L	19.3	6.26	d	8.78	2.19	9.72	2.05	*19.8	*3.31	79.5	13.3
9	Aluminum	30	ug/L	403	0.088	w	281	0.07	15	3.79	*0.42	*0.15	1690	602
9	Copper	10	ug/L	333	0.118	w	45.8	0.011	14.8	3.28	**0.045	*.02	181	80
9	Zinc	10	ug/L	166	0.041	w	121	0.03	13.7	3.84	**0.09	**0.046	361	185
25	Oil and grease	1	mg/L	2.25	0.617	w	2.25	0.56	14.3	3.85	*2.1	*0.92	8.4	3.7
	Flow		m3/d	249		d	249							

* – Values calculated using corresponding LVF's for Praxair Canada Inc. , Moore

** – Values calculated using corresponding LVF's for Praxair Canada Inc. , Sarnia

Appendix B

Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

Puritan–Bennett Corporation, Maitland – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Ammonia plus Ammonium	0.25	mg/L	58.5	15.8	w	2	0.54	7.27	2.47	3.92	1.34	14.6	5
4	Nitrate+Nitrite	0.25	mg/L	51.7	14	w	4.6	1.24	2.34	1.47	2.91	1.82	10.8	6.74
4	Total Kjeldahl nitrogen	0.5	mg/L	61.8	16.7	w	2	0.54	5.83	2.15	3.14	1.16	11.6	4
5	DOC	0.5	mg/L	2.55	0.689	w	2.55	0.689	2.28	1.45	1.57	0.999	5.82	3.7
6	Total phosphorus	0.1	mg/L	0.114	0.031	q	0.1	0.027	–	–	0.108	0.054	0.4	0.2
8	Total suspended solids	5	mg/L	2.66	0.718	d	5	1.35	–	–	5.4	2.7	20	10
	Flow		m3/d	270		d	270							

Sulco Chemicals Limited , Elmira – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
2	Cyanide Total	0.005	mg/L	0.03	0.002	q	0.03	0.002	6.82	2.37	0.0136	0.00474	0.2	0.0696
5	DOC	0.5	mg/L	4.97	0.356	w	4.97	0.356	4.02	1.76	1.43	0.627	21	9.2
6	Total phosphorus	0.1	mg/L	0.664	0.046	w	1	0.068	2.98	1.21	0.203	0.082	2.9	1.2
8	Total suspended solids	5	mg/L	14.8	0.739	d	10	0.68	4.26	1.83	2.9	1.24	42.6	18.3
9	Aluminum	30	ug/L	240	0.017	q	240	0.017	4.99	1.32	0.0848	0.0224	1250	330
9	Cadmium	2	ug/L	5.16	0.0004	q	5.16	0.0004	4.01	1.87	0.0016	0.00075	23.6	11
9	Copper	10	ug/L	37	0.003	q	37	0.003	4.18	1.77	0.0125	0.00531	184	78
9	Nickel	20	ug/L	38.1	0.003	q	38.1	0.003	7.32	2.48	0.022	0.00744	322	109
9	Vanadium	30	ug/L	53.2	0.004	q	53.2	0.004	9.97	1.75	0.0399	0.007	586	103
9	Zinc	10	ug/L	1590	0.11	q	200	0.014	5.36	1.34	0.0751	0.0188	1103	276
10	Arsenic	5	ug/L	5.5	0.0004	q	9.5	0.0006	2.11	1.11	0.0014	0.00068	20	10
14	Phenolics (4AAP)	2	ug/L	3.57	0.0002	q	3.57	0.00024	13	1.63	*0.00243	0.0004	35.6	5.8
25	Oil and grease	1	mg/L	2.26	0.157	q	2.26	0.157	6.1	2.24	0.958	0.352	14.1	5.16
11	Chloride	2	mg/L	1830	123	w	1830	123	2.21	1.12	272	138	3990	2020
12	Fluoride	0.1	mg/L	4.07	0.278	w	4.07	0.278	5.58	1.52	1.55	0.423	22.8	6.2
13	Sulphate	5	mg/L	1640	114	w	1640	114	5.39	1.35	614	154	9020	2260
	Flow		m3/d	68.1		d	68.1							

* – LVF1 of 10 used in calculation

Appendix B

Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

Terra Industries (Canada) Inc. , Courtright – 0500				CURRENT		BAT#4								
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Ammonia plus Ammonium	0.25	mg/L	2.36	20.4	d	2.36	20.4	3.49	1.25	71.2	25.5	6.91	2.48
4	Nitrate+Nitrite	0.25	mg/L	3.96	38.8	d	3.96	38.8	4.31	1.38	168	53.7	16.3	5.21
4	Total Kjaldehl nitrogen	0.5	mg/L	3.39	29.7	d	2	17.5	5.76	1.34	101	23.5	9.8	2.3
5	DOC	0.5	mg/L	3.21	35.3	w	3.21	35.3	3.7	1.68	131	59.3	12.7	5.76
6	Total phosphorus	0.1	mg/L	0.214	2.11	q	0.214	2.11	4.76	1.27	10	2.68	0.975	0.26
8	Total suspended solids	5	mg/L	7.61	80.7	d	7.61	80.7	5.75	1.41	464	114	45.1	11
9	Zinc	10	ug/L	51.9	0.6	q	51.9	0.6	11.1	2.6	*6.0	1.56	582	151
14	Phanolics (4AAP)	2	ug/L	10.1	0.098	w	10.1	0.098	10.1	3.05	1	0.3	96.1	29.1
12	Fluoride	0.1	mg/L	0.122	1.25	q	0.122	1.25	3.16	1.21	3.95	1.51	0.383	0.147
13	Sulphate	5	mg/L	21.8	224	q	21.8	224	2.82	1.24	632	278	61.3	27
	Flow		m3/d	10300		d	10300							

* – Values based on LVF1 of 10

Terra Industries (Canada) Inc. , Courtright – 0700				CURRENT		BAT#4								
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Ammonia plus Ammonium	0.25	mg/L	1.39	63.8	d	1.39	63.8	17.1	2.99	*165	*81.7	3	1.5
4	Nitrate+Nitrite	0.25	mg/L	0.818	45.3	d	0.818	45.3	9.07	1.68	411	76.1	7.38	1.37
4	Total Kjeldahl nitrogen	0.5	mg/L	2.92	142	d	2.92	142	15.1	2.08	**349	**187	54.5	9.01
5	DOC	0.5	mg/L	3.05	161	w	3.05	161	3.46	1.63	557	262	10	4.71
6	Total phosphorus	0.1	mg/L	0.12	7.33	q	0.12	7.33	4	2	29.3	14.7	0.53	0.3
8	Total suspended solids	5	mg/L	5.96	333	d	5.96	333	4.62	1.28	1540	426	27.6	7.65
14	Phenolics (4AAP)	2	ug/L	13.3	0.793	w	13.3	0.793	6.71	2.35	5.32	1.86	95.5	33.5
	Flow		m3/d	55700		d	55700							

* – Values based on LVF1 and LVFML of 2.58 and 1.28 respectively (LVF's for Ammonia at 0800) ** LVF1 = 2.45 and LVFM = 1.31

Terra Industries (Canada) Inc. , Courtright – 0800				CURRENT		BAT#4								
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Ammonia plus Ammonium	0.25	mg/L	2.49	40.6	d	–	–	2.58	1.28	57	28.5	3.5	1.8
4	Nitrate+Nitrite	0.25	mg/L	0.652	10.4	d	0.652	10.4	6.71	1.41	69.8	14.7	4.33	0.911
4	Total Kjaldahl nitrogen	0.5	mg/L	3.01	48.9	d	2	32.6	2.7	1.25	88	40.7	5.5	2.5
5	DOC	0.5	mg/L	6.94	113	w	6.94	113	3.71	1.69	419	191	26	11.9
6	Total phosphorus	0.1	mg/L	0.064	1.01	q	0.064	1.01	–	–	6.44	3.22	0.4	0.2
8	Total suspended solids	5	mg/L	11.4	191	d	11.4	191	7.77	1.78	1480	340	92.2	21.1
9	Aluminum	30	ug/L	122	2.05	q	122	2.05	4.34	1.82	8.9	3.73	553	232
9	Zinc	10	ug/L	42	0.74	q	42	0.74	7.77	2.6	5.75	1.92	357	120
14	Phenolics (4AAP)	2	ug/L	13.8	0.23	w	13.8	0.23	4.76	1.97	1.09	0.453	68	28.1
13	Sulphate	5	mg/L	40.7	724	q	40.7	724	2.8	1.48	2030	1070	126	66.6
	Flow		m3/d	16100		d	16100							

Appendix B   Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

UCAR Carbon Canada Inc. , Welland – 0200

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
4	Nitrate+Nitrite	0.25	mg/L	0.832	0.092	q	0.832	0.092	14.3	3.87	1.32	0.356	7.31	1.98
5	DOC	0.5	mg/L	7.34	0.489	w	7.34	0.489	13.1	2.35	6.41	1.15	35.6	6.38
6	Total phosphorus	0.1	mg/L	0.09	0.007	q	0.09	0.007	7.43	2.49	0.052	0.0174	0.289	0.0968
8	Total suspended solids	5	mg/L	5.81	0.95	d	5.81	0.95	10.3	4.97	9.79	4.72	54.4	26.2
9	Aluminum	30	ug/L	208	0.045	q	208	0.045	14.2	3.87	0.639	0.174	3550	968
9	Zinc	10	ug/L	52.9	0.009	q	52.9	0.009	11.5	3.43	0.104	0.0309	575	172
14	Phenolics (4AAP)	2	ug/L	4.58	0.0008	q	4.58	0.0008	12.6	3.69	0.0101	0.00295	56	16.4
25	Oil and grease	1	mg/L	2.09	0.215	q	2.09	0.215	12.4	3.55	2.67	0.763	14.8	4.24
I1	Chloride	2	mg/L	151	20.2	q	151	20.2	18.5	1.74	374	35.1	2080	195
I3	Sulphate	5	mg/L	240	38.5	q	240	38.5	39.7	2.55	1530	98.2	8490	545
	Flow		m3/d	180		d	180							

ATG Washington Mills Limited , Niagara Falls – 0100

ATG	PARAMETER	RMDL	UNIT	CURRENT CLTA	CURRENT LLTA	BAT#4 Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	2.11	4.48	w	2.11	3.1	7.62	2.53	23.6	7.84	16.2	5.37
6	Total phosphorus	0.1	mg/L	0.066	0.134	q	0.066	0.134	–	–	0.584	0.292	0.4	0.2
8	Total suspended solids	5	mg/L	22.1	46.6	d	7.9	11.5	1.86	1.33	*60	*18	41.2	12.4
9	Aluminum	30	ug/L	67.8	0.14	w	311	0.454	6.7	2.34	3.04	1.06	2080	728
25	Oil and grease	1	mg/L	6.13	12.3	w	2.04	2.98	4.74	1.93	14.1	5.75	9.67	3.94
	Flow		m3/d	2050		d	1460							

* – Used LVFs for Washington Mills Electro–Minerals Corporation – 0200

Appendix B — Summary of Current (89–90 monitoring data) versus BAT 4 Performance Data

Washington Mills Electro–Minerals Corporation , Niagara Falls – 0100

				CURRENT		BAT#4								
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	3	19.9	w	3	5.97	3.61	1.66	21.6	9.9	9.29	4.27
6	Total phosphorus	0.1	mg/L	0.07	0.553	q	0.07	0.23	–	–	0.928	0.464	0.4	0.2
8	Total suspended solids	5	mg/L	5.78	40.8	d	7.9	16.6	3.59	1.38	60	23	25.7	10
9	Aluminum	30	ug/L	147	1.09	w	147	0.327	3.92	1.75	1.28	0.572	553	247
25	Oil and grease	1	mg/L	1.06	8.24	q	1.06	2.47	2.4	1.32	5.93	3.26	2.56	1.41
	Flow		m3/d	7730		d	2320							

Washington Mills Electro–Minerals Corporation , Niagara Falls – 0200

				CURRENT		BAT#4								
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	LVF1	LVFML	LDAYL	LML	CDAYL	CML
5	DOC	0.5	mg/L	3.55	38.9	w	3.55	11.7	5.06	1.98	59.2	23.2	19.3	7.57
6	Total phosphorus	0.1	mg/L	0.076	0.782	q	0.08	0.31	–	–	1.22	0.612	0.4	0.2
8	Total suspended solids	5	mg/L	5.05	51.4	d	7.9	24	5.22	1.57	125	38	41	12.3
9	Aluminum	30	ug/L	138	1.31	w	138	0.393	3.88	1.73	1.52	0.68	498	222
25	Oil and grease	1	mg/L	1.24	12.7	q	1.24	3.06	4.35	1.75	13.3	5.36	4.35	1.75
	Flow		m3/d	10200		d	3060							

Welland Chemical Limited , Sarnia – 0200

				CURRENT		BAT#4							
ATG	PARAMETER	RMDL	UNIT	CLTA	LLTA	Freq.	CLTA	LLTA	CVF1	CVF4	L/BATCH*		C/BATCH+
4	Nitrate+Nitrite	0.25	mg/L	0.91	0.152	b	0.91	0.152	3.77	1.7	0.573	–	3.52
5	DOC	0.5	mg/L	6.92	1.05	b	6.92	1.05	9.33	2.97	9.8	–	60.1
6	Total phosphorus	0.1	mg/L	0.084	0.014	b	0.084	0.014	–	–	0.051	–	0.4
8	Total suspended solids	5	mg/L	10.4	1.74	b	–	–	3.14	1.6	5.46	–	**15
9	Aluminum	30	ug/L	443	0.068	b	–	–	5.43	2.06	0.12	–	**750
16	Chloroform	0.7	ug/L	90.7	0.018	b	90.7	0.018	15	3.82	0.27	–	1660
	Flow		m3/d	163		b	163						

b – each Batch
* – Loading Limit per Batch
+ – Concentration Equivalent Limit per Batch
** – Based on C of A Limit

APPENDIX C

THE INORGANIC CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

DEVELOPMENT DOCUMENT FOR THE INORGANIC

CHEMICAL SECTOR EFFLUENT LIMITS REGULATION

DRAFT REGULATION TO BE MADE UNDER THE ENVIRONMENTAL PROTECTION ACT

EFFLUENT MONITORING AND EFFLUENT LIMITS - INORGANIC CHEMICAL SECTOR

PART I - GENERAL

Interpretation

1.-(1) In this Regulation,

"assessment parameter" means a parameter that is listed in column 1 of Schedule 4 for the discharger's plant;

"blowdown water" means recirculating water that is discharged from a cooling water system for the purpose of controlling the level of water in the cooling water system or for the purpose of discharging from the cooling water system materials contained in the cooling water system the further build-up of which would impair the operation of the system;

"combined effluent" means process effluent combined with cooling water effluent or storm water effluent, or both;

"combined effluent monitoring stream" means a stream on which a combined effluent sampling point is established;

"combined effluent sampling point", in relation to a plant, means a combined effluent sampling point that is specified for the plant in Schedule 4;

"common parameter", in relation to a combined effluent monitoring stream at a plant, means an assessment parameter that is also a limited parameter in the circumstances described in subsection 14(1);

"cooling water effluent" means water and associated material that is used in an industrial process for the purpose of removing heat and that has not, by design, come into contact with process materials, but does not include blowdown water ;

"cooling water effluent monitoring stream" means a stream on which a cooling water effluent sampling point is established;

"cooling water effluent sampling point", in relation to a plant, means a cooling water effluent sampling point that is specified for the plant in Schedule 4;

"Director", in relation to obligations of a discharger, means a Director appointed under section 5 of the Act and responsible for the region in which the discharger's plant is located and includes an alternate named by the Director;

"discharger" means an owner or person in occupation or having the charge, management or control of a plant to which this Regulation applies;

"limited parameter", in relation to a plant, means a parameter for which a limit is specified for the plant in column 3, 4 or 5 of Schedule 2;

"pick up", in relation to a sample, means pick up for the purpose of storage, if any, at a plant, including storage within an automated sampling device at the plant, and transportation to and analysis at a laboratory;

"plant" means an industrial facility and the developed property, waste disposal sites and wastewater treatment facilities associated with it;

"process change" means a change in equipment, production processes, process materials or treatment processes;

"process effluent" means,

(a) effluent that, by design, has come into contact with process materials,

(b) blowdown water,

(c) effluent that results from cleaning or maintenance operations at a plant during a period when all or part of the plant is shut down, and

(d) waste disposal site effluent;

"process effluent batch" means a process effluent that is discharged intermittently with a discharge duration of less than 24 hours for each batch and a time interval of at least 8 hours between successive batches;

"process effluent batch monitoring stream" means a stream on which a process effluent batch sampling point is established;

"process effluent batch sampling point", in relation to a plant, means a process effluent batch sampling point that is specified for the plant in Schedule 3;

"process effluent monitoring stream" means a stream on which a process effluent sampling point is established;

"process effluent sampling point", in relation to a plant, means a process effluent sampling point that is specified for the plant in Schedule 2 or 3, as the case may be;

"process materials", in relation to a discharger's plant, means raw materials for use in an industrial process at the plant, manufacturing intermediates produced at the plant, or products or by-products of an industrial process at the plant, but does not include chemicals added to cooling water for the purpose of controlling organisms, fouling and corrosion;

"quarter" means all or part of a period of three consecutive months beginning on the first day of January, April, July or October;

"semi-annual period" means all or part of a period of six months beginning on the first day of January or July;

"specific parameter", in relation to a plant, means 2,3,7,8-tetrachlorodibenzo-para-dioxin, 2,3,7,8-tetrachlorodibenzofuran, and 2,3,7,8 substituted dioxin and furan congeners;

"storm water effluent" means run-off from a storm event or thaw that is not used in any industrial process.

(2) For greater certainty, this Regulation applies both to effluent streams that discharge continuously and to effluent streams that discharge intermittently.

(3) An obligation on a discharger to do a thing under this Regulation is discharged if another person has done it on the discharger's behalf.

Purpose

2. The purpose of this Regulation is to monitor and control the quality of effluent discharged from the plants listed in Schedule 1.

Application

3.-(1) This Regulation applies only with respect to the plants listed in Schedule 1.

(2) This Regulation does not apply with respect to the discharge of effluent to a municipal sewer.

Obligations Under Approvals, Orders, etc.

4. For greater certainty, the requirements of this Regulation are in addition to and independent of requirements in an approval, order, direction or other instrument issued under any Act.

Non-application of the General Effluent Monitoring Regulation

5. This Regulation is not a Sectoral Effluent Monitoring Regulation within the meaning of Ontario Regulation 695/88.

By-passes

6. Beginning on ________, 19__, a discharger shall not permit process effluent to be discharged from the discharger's plant unless the process effluent flows past a process effluent sampling point or a process effluent batch sampling point at the plant before being discharged.

(The date that is 3 years after the day on which this Regulation is filed will be inserted in section 6)

Sampling and Analytical Procedures

7.-(1) Each discharger shall carry out the sampling and analysis obligations of this Regulation, including quality control sampling and analysis obligations, in accordance with the procedures described in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994.

(2) Each discharger shall maintain the sampling equipment used at the discharger's plant for sampling required by this Regulation in a way that ensures that the samples collected at the plant under this Regulation accurately reflect the level of discharge of each limited parameter, assessment parameter and specific parameter from the plant.

PART II - SAMPLING POINTS

Sampling Points To Be Used

8.-(1) Subject to section 23, each discharger shall, by ____ , 19__, use the sampling points specified for the discharger's plant in the Schedules to this Regulation for the purpose of carrying out all sampling required by this Regulation.

(The date that is 90 days after the day on which this Regulation is filed will be inserted in subsection 8(1)).

(2) If circumstances change so that a new sampling point is necessary at a discharger's plant in order to permit the calculation of plant loadings under sections 10, 11, 12, 13 and 14 for each limited parameter and assessment parameter and the determination of concentrations for each specific parameter that accurately reflect the level of discharge of each such parameter from the plant, the discharger shall, within thirty days of the change, establish the new sampling point.

(3) A discharger may eliminate a sampling point established under subsection (1) or (2) if the sampling point is no longer necessary to permit the calculation of plant loadings under sections 10, 11, 12, 13 and 14 for each limited parameter and assessment parameter and the determination of concentrations for each specific parameter that accurately reflect the level of discharge of each such parameter from the plant.

(4) Before using a new sampling point or eliminating a sampling point specified in the Schedules to this Regulation, a discharger shall give the Director written notice setting out the name, number and location of the sampling point and its change in status.

PART III - CALCULATION OF LOADINGS

Calculation of Loadings - General

9.-(1) For the purposes of performing a calculation under sections 10, 11, 12, 13 and 14, a discharger shall use the actual analytical result obtained by the laboratory.

(2) Despite subsection (1), where the actual analytical result is less than one-tenth of the analytical method detection limit set out in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994, the discharger shall use the value zero for the purpose of performing a calculation under sections 10, 11, 12, 13 and 14.

(3) Each discharger shall ensure that each calculation of a process effluent loading required by section 10 and each calculation of a process effluent batch loading required by section 11 is performed as soon as reasonably possible after the analytical result on which the calculation is based becomes available to the discharger.

(4) Each discharger shall ensure that each calculation of a cooling water effluent loading required by section 12 and each calculation of a combined effluent loading required by section 13 is performed in time to comply with subsection 38(4).

(5) Each discharger shall ensure that each calculation of a process effluent loading contribution required by section 14 is performed in time to comply with subsection 38(6).

Calculation of Loadings - Process Effluent- General

10.-(1) Each discharger shall calculate, in kilograms, a daily process effluent stream loading for each limited parameter in each process effluent monitoring stream of the discharger for each day on which a sample is collected under this Regulation from the stream for analysis for the parameter.

(2) When calculating a daily stream loading under subsection (1), the discharger shall multiply, with the necessary adjustment of units to yield a result in kilograms, the analytical result obtained from the sample for the parameter by the daily volume of effluent, as determined under section 31, for the stream for the day.

(3) Each discharger shall calculate, in kilograms, a daily process effluent plant loading for each limited parameter for each day for which the discharger is required to calculate a daily process effluent stream loading for the parameter under subsection (1).

(4) For the purposes of subsection (3), a daily process effluent plant loading for a parameter for a day is the sum, in kilograms, of the daily process effluent stream loadings for the parameter calculated under subsection (1) for the day.

(5) Where a discharger calculates only one daily process effluent stream loading for a parameter for a day under subsection (1), the daily process effluent plant loading for the parameter for the day for the purposes of subsection (3) is the single daily process effluent stream loading for the parameter for the day.

(6) Each discharger shall calculate, in kilograms, a monthly average process effluent plant loading for each limited parameter for each month in which a sample is collected under this Regulation more than once from a process effluent monitoring stream at the discharger's plant for analysis for the parameter.

(7) For the purposes of subsection (6), a monthly average process effluent plant loading for a parameter for a month is the arithmetic mean of the daily process effluent plant loadings for the parameter calculated under subsection (3) for the month.

Calculation of Loadings - Process Effluent - Batch

11.-(1) Each discharger shall calculate, in kilograms, a process effluent batch loading for each limited parameter in each process effluent batch monitoring stream of the discharger for each batch of process effluent for which a sample is collected under this Regulation from the stream for analysis for the parameter.

(2) When calculating a batch loading under subsection (1), the discharger shall multiply, with the necessary adjustment of units to yield a result in kilograms, the analytical result obtained from the sample for the parameter by the volume of effluent, as determined under section 31, for the stream for the batch.

Calculation of Loadings - Cooling Water

12.-(1) Each discharger shall calculate, in kilograms, a daily cooling water effluent stream loading for each assessment parameter in each cooling water effluent monitoring stream of the discharger for each day on which a sample is collected under this Regulation from the stream for analysis for the parameter.

(2) When calculating a daily stream loading under subsection (1), the discharger shall multiply, with the necessary adjustment of units to yield a result in kilograms, the analytical result obtained from the sample for the parameter by the daily volume of effluent, as determined under section 31, for the stream for the day.

(3) Each discharger shall calculate, in kilograms, a daily cooling water effluent plant loading for each assessment parameter for each day for which the discharger is required to calculate a daily cooling water effluent stream loading for the parameter under subsection (1).

(4) For the purposes of subsection (3), a daily cooling water effluent plant loading for a parameter for a day is the sum, in kilograms, of the daily cooling water effluent stream loadings for the parameter calculated under subsection (1) for the day.

(5) Where a discharger calculates only one daily cooling water effluent stream loading for a parameter for a day under subsection (1), the daily cooling water effluent plant loading for the parameter for the day for the purposes of subsection (3) is the single daily cooling water effluent stream loading for the parameter for the day.

(6) Each discharger shall calculate, in kilograms, a monthly average cooling water effluent plant loading for each assessment parameter for each month in which a sample is collected under this Regulation more than once from a cooling water effluent monitoring stream at the discharger's plant for analysis for the parameter.

(7) For the purposes of subsection (6), a monthly average cooling water effluent plant loading for a parameter for a month is the arithmetic mean of the daily cooling water effluent plant loadings for the parameter calculated under subsection (3) for the month.

Calculation of Loadings - Combined Effluent

13.-(1) Each discharger shall calculate, in kilograms, a daily combined effluent stream loading for each assessment parameter in each combined effluent monitoring stream of the discharger for each day on which a sample is collected under this Regulation from the stream for analysis for the parameter.

(2) When calculating a daily stream loading under subsection (1), the discharger shall multiply, with the necessary adjustment of units to yield a result in kilograms, the analytical result obtained from the sample for the parameter by the daily volume of effluent, as determined under section 31, for the stream for the day.

(3) Each discharger shall calculate, in kilograms, a daily combined effluent plant loading for each assessment parameter for each day for which the discharger is required to calculate a combined effluent stream loading for the parameter under subsection (1).

(4) For the purposes of subsection (3), a daily combined effluent plant loading for a parameter for a day is the sum, in kilograms, of the daily combined effluent stream loadings for the parameter calculated under subsection (1) for the day.

(5) Where a discharger calculates only one daily combined effluent stream loading for a parameter for a day under subsection (1), the daily combined effluent plant loading for the parameter for the day for the purposes of subsection (3) is the single daily combined effluent stream loading for the parameter for the day.

(6) Each discharger shall calculate, in kilograms, a monthly average combined effluent plant loading for each assessment parameter for each month in which a sample is collected under this Regulation more than once from a combined effluent monitoring stream at the discharger's plant for analysis for the parameter.

(7) For the purposes of subsection (6), a monthly average combined effluent plant loading for a parameter for a month is the arithmetic mean of the daily combined effluent plant loadings for the parameter calculated under subsection (3) for the month.

Calculation of Additional Loadings - Combined Effluent

14.-(1) For each assessment parameter and each combined effluent monitoring stream of the discharger, the discharger shall determine whether the parameter is also a limited parameter for any process effluent sampling point established on a process effluent monitoring stream that flows into the combined effluent monitoring stream.

(2) The discharger shall calculate, in kilograms, a daily process effluent loading contribution for each common parameter from a process effluent monitoring stream that flows into the combined effluent monitoring stream for each day for which a sample is collected under this Regulation from the combined effluent monitoring stream.

(3) For the purposes of subsection (2), a daily process effluent loading contribution for a common parameter for a day is the sum, in kilograms, of the daily process effluent stream loadings for the parameter calculated under subsection 10(1) for the day in each process effluent monitoring stream that flows into the combined effluent monitoring stream on the day a sample is collected from the combined effluent monitoring stream.

(4) A daily process effluent loading contribution for a common parameter for a day for the purposes of subsection (3) may be a single daily process effluent stream loading for the parameter for the day if,

(a) there is only one process effluent monitoring stream that flows into the combined effluent monitoring stream; or

(b) there is only one daily process effluent stream loading calculated for the parameter under subsection 10(1) for the day in respect of all of the process effluent monitoring streams that flow into the combined effluent monitoring stream.

(5) Each discharger shall calculate, in kilograms, a monthly average process effluent loading contribution for each common parameter for each month in which a sample is collected under this Regulation more than once for analysis for the parameter from any process effluent monitoring stream at the discharger's plant that flows into the combined effluent monitoring stream.

(6) For the purposes of subsection (5), a monthly average process effluent loading contribution for a common parameter for a month is the arithmetic mean of the daily process effluent loading contributions for the parameter calculated under subsection (2) for the month.

PART IV - PARAMETER AND LETHALITY LIMITS

Parameter Limits

15.-(1) Each discharger shall ensure that each daily process effluent plant loading calculated for a parameter under section 10 in connection with the discharger's plant does not exceed the daily plant loading limit specified for the parameter and the plant in Column 3 of Schedule 2.

(2) Each discharger shall ensure that each monthly average process effluent plant loading calculated for a parameter under section 10 in connection with the discharger's plant does not exceed the monthly average plant loading limit specified for the parameter and the plant in Column 4 of Schedule 2.

(3) Each discharger shall ensure that each process effluent batch loading calculated for a parameter under section 11 in connection with the discharger's plant does not exceed the batch loading limit specified for the parameter and the plant in Column 5 of Schedule 2.

(4) Each discharger shall control the quality of each process effluent monitoring stream and each process effluent batch monitoring stream at the discharger's plant to ensure that the concentration of 2,3,7,8-tetrachlorodibenzo-para-dioxin and the concentration of 2,3,7,8-tetrachlorodibenzofuran are both non-measurable in any sample collected at a process effluent sampling point or a process effluent batch sampling point at the plant.

(5) For the purposes of subsection (4), the concentration of 2,3,7,8-tetrachlorodibenzo-para-dioxin in a sample is non-measurable if analysis of the sample shows a concentration of 2,3,7,8-tetrachlorodibenzo-para-dioxin of less than 20 picograms per litre and the concentration of 2,3,7,8-tetrachlorodibenzofuran in a sample is non-measurable if analysis of the sample shows a concentration of 2,3,7,8-tetrachlorodibenzofuran of less than 50 picograms per litre.

(6) Each discharger shall control the quality of each process effluent monitoring stream and each process effluent batch monitoring stream at the discharger's plant to ensure that the total toxic equivalent concentration of 2,3,7,8 substituted dioxin and furan congeners in any sample collected at a process effluent sampling point or a process effluent batch sampling point at the plant, calculated in accordance with the methods described in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994, does not exceed 60 picograms per litre.

(7) Subject to subsection (8), each discharger shall control the quality of each process effluent monitoring stream and each process effluent batch monitoring stream at the discharger's plant to ensure that the pH value of any sample collected at a process effluent sampling point or a process effluent batch sampling point at the plant is within the range of 6.0 to 9.5.

(8) Throughout any day on which a discharger has used an alternate sampling point on a process effluent monitoring stream for sampling required by section 23, as permitted by subsections 23(7) and (8), the discharger,

(a) shall control the quality of the stream to ensure that the pH value of any sample collected at the alternate sampling point on the stream is within the range of 6.0 to 9.5; and

(b) need not comply with subsection (7) with respect to the stream.

Lethality Limits

16. Each discharger shall control the quality of each process effluent monitoring stream, each process effluent batch monitoring stream, each cooling water effluent monitoring stream and each combined effluent monitoring stream at the discharger's plant, for which a sampling point for lethality limits has been designated in Schedule 5, to ensure that each rainbow trout acute lethality test and each Daphnia magna acute lethality test performed on any grab sample collected at the designated sampling points for lethality limits at the plant, results in mortality for no more than fifty percent of the test organisms in one-hundred percent effluent.

PART V - MONITORING - CHEMICAL PARAMETERS

Monitoring - General

17.-(1) Despite sections 18 to 28 and 30, a discharger need not collect samples from any stream at the discharger's plant on a day on which there is no process effluent that is being discharged from the plant.

(2) Where a discharger is required by this Regulation to pick up a set of samples and analyze it for certain parameters the discharger shall pick up a set of samples sufficient to allow all the analyses to be performed.

(3) A discharger shall use all reasonable efforts to ensure that all analyses required by this Regulation are completed as soon as reasonably possible and that the results of those analyses are made available to the discharger as soon as reasonably possible.

(4) Subject to subsection (5), if a discharger is required or permitted in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994, to collect a composite sample for any sample required to be picked up at the discharger's plant under section 18, 19, 20, 24 or 25, the discharger shall pick up the composite sample between the hours of 7.00 a.m. and 10.00 a.m.

(5) If the Director is satisfied, on the basis of written submissions from a discharger, that the circumstances at the discharger's plant are such that it would be impractical to pick up composite samples from each process effluent sampling point, each cooling water effluent sampling point and each combined effluent sampling point at the plant within the time period specified in subsection (4), the Director may give the discharger a written notice in respect of the plant, varying the time period specified in subsection (4).

(6) Subject to subsections (7) and (8), where a discharger is required by section 18, 19, 20, 24 or 25 to pick up a set of samples the discharger shall pick up a set collected over the twenty-four hour period immediately preceding the pick-up.

(7) The twenty-four hour period referred to in subsection (6) may be shortened or enlarged by up to three hours to permit a discharger to take advantage of the three hour range specified in subsection (4) or of a different three hour period specified in a notice under subsection (5).

(8) Where a notice has been given under subsection (5) in respect of a plant specifying a time period longer than three hours, the twenty-four hour period referred to in subsection (6) may be shortened or enlarged by up to that longer amount of time to permit the discharger to take advantage of the time period specified in the notice.

(9) If the circumstances at a plant change so that the Director is satisfied that the circumstances described in subsection (5) no longer apply at the plant, the Director may revoke a notice given in respect of a plant under subsection (5) by giving a notice of revocation in writing to a discharger for the plant.

Monitoring - Process Effluent - Daily

18.-(1) Each discharger for which a process effluent sampling point is specified in Schedule 2 for the discharger's plant shall, on each day, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters for which the frequency of monitoring, as set out in column 2 of Schedule 2 for the discharger's plant, is daily.

(2) Each discharger for which a process effluent sampling point is specified in Schedule 3 for the discharger's plant shall, on each day, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule, for which the frequency of monitoring, as set out in column 2 of Schedule 2, is daily.

(3) Despite subsections (1) and (2), where for twelve consecutive months, the monthly average plant loading of a limited parameter is equal to or less than seventy-five percent of the monthly average plant loading limit for the parameter as set out in Column 4 of Schedule 2 for the discharger's plant, the discharger may reduce the frequency of monitoring for that parameter from daily to three times per week.

(4) Subsection (3) ceases to apply and the discharger shall monitor in accordance with subsections (1) and (2), where the daily plant loading limit for a limited parameter as set out in Column 3 of Schedule 2 for the discharger's plant is exceeded more then twice or the monthly average plant loading limit for a limited parameter as set out in Column 4 of Schedule 2 for the discharger's plant is exceeded more than once during any twelve consecutive months.

(5) Where a discharger changes the frequency of monitoring at the discharger's plant under subsections (3) or (4), the discharger shall notify the Director in writing within thirty days after the day on which a change occurs.

(6) A discharger need not meet the requirements of subsections (1) or (2) where it is impossible to do so because of sampling by a provincial officer.

Monitoring - Process Effluent - Weekly

19.-(1) Each discharger for which a process effluent sampling point is specified in Schedule 2 for the discharger's plant shall, on one day in each week, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters for which the frequency of monitoring, as set out in column 2 of Schedule 2 for the discharger's plant, is weekly.

(2) Each discharger for which a process effluent sampling point is specified in Schedule 3 for the discharger's plant shall, on one day in each week, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule, for which the frequency of monitoring, as set out in column 2 of Schedule 2, is weekly.

(3) There shall be an interval of at least four days between successive pick-up days at the plant under this section.

(4) All samples picked up under this section in a week shall be picked up on the same day in the week.

Monitoring - Process Effluent - Quarterly

20.-(1) Each discharger for which a process effluent sampling point is specified in Schedule 2 for the discharger's plant shall, on one day in each quarter, on a day on which samples are picked up at the plant under section 19, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters for which the frequency of monitoring, as set out in column 2 of that Schedule, is quarterly.

(2) Each discharger for which a process effluent sampling point is specified in Schedule 3 for the discharger's plant shall, on one day in each quarter, on a day on which samples are picked up at the plant under section 19, pick up a set of samples collected at each process effluent sampling point at the plant and shall analyze each set of samples for the parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule, for which the frequency of monitoring, as set out in column 2 of Schedule 2, is quarterly.

(3) There shall be an interval of at least forty-five days between successive pick-up days at the plant under this section.

(4) All samples picked up under this section in a quarter shall be picked up on the same day in the quarter.

Monitoring - Process Effluent - Batch

21.-(1) Each discharger for which a process effluent batch sampling point is specified in Schedule 3 for the discharger's plant, shall, for each batch of process effluent that flows past a process effluent batch sampling point, pick up a set of samples collected at the process effluent batch sampling point and analyze each set of samples for the parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule.

(2) Where a discharger is required by subsection (1) to pick up a set of samples at a process effluent batch sampling point, the discharger shall pick up a set collected over the period during which the batch of process effluent flows past the sampling point.

Monitoring - Process Effluent - Quality Control

22.-(1) On one day in each year after ____, on a day on which samples are picked up at the plant under sections 19 and 20, each discharger for which a process effluent sampling point is specified in Schedule 2 for the discharger's plant shall collect and pick up a duplicate sample for each sample picked up on that day under sections 19 and 20 at one process effluent sampling point at the discharger's plant and shall analyze each duplicate sample for each parameter for which the frequency of monitoring, as set out in column 2 of Schedule 2 for the discharger's plant, is weekly or quarterly.

(2) On one day in each year after ____, on a day on which samples are picked up at the plant under sections 19 and 20, each discharger for which a process effluent sampling point is specified in Schedule 3 for the discharger's plant shall do the following:

1. Determine which one of the process effluent sampling points at the plant has the greatest number of parameters listed in column 1 of Schedule 3 and specified for the sampling point in the column for that sampling point in the Schedule, for which the frequency of monitoring, as set out in column 2 of Schedule 2, is weekly or quarterly.

2. Collect and pick up a duplicate sample for each sample picked up on that day under sections 19 and 20 at the process effluent sampling point described in paragraph 1.

3. Analyze each duplicate sample for each parameter specified for the process effluent sampling point described in paragraph 1 for which the frequency of monitoring, as set out in column 2 of Schedule 2, is weekly or quarterly.

(3) Each discharger shall prepare a travelling blank and a travelling spiked blank sample for each sample for which a duplicate sample is picked up at the plant under this section and shall analyze the travelling blank and travelling spiked blank samples in accordance with the directions set out in the Ministry of Environment and Energy publication entitled "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater", dated August, 1994.

(4) There shall be an interval of at least six months between successive pick-up days at the plant under this section.

Monitoring - Process Effluent - pH Measurement

23.-(1) Each discharger shall, on each day during the time period applicable to the plant under subsection 17(4) or (5), collect a grab sample from each process effluent sampling point at the discharger's plant and shall analyze each sample for the parameter pH.

(2) Each discharger shall, within each twenty-four hour period beginning with the collection of the first grab sample at the plant under subsection (1) on each day, collect two more grab samples from each process effluent sampling point at the discharger's plant and shall analyze each sample for the parameter pH.

(3) There shall be an interval of at least four hours between each of the three collections at a sampling point under subsections (1) and (2) in each twenty-four hour period.

(4) Each grab sample collected under subsections (1) and (2) shall be picked up within twenty-four hours of when it was collected.

(5) Instead of complying with subsections (1) to (4) with respect to a sampling point on a stream, a discharger may use an on-line analyzer at the sampling point on the stream and analyze the effluent at the sampling point for the parameter pH once in each day during the time period applicable to the plant under subsection 17(4) or (5), and two more times in each twenty-four hour period beginning with the first analysis at the plant under this subsection in each day.

(6) There shall be an interval of at least four hours between each of the three analyses at a sampling point under subsection (5) in each twenty-four hour period.

(7) For the purposes of subsections (1) to (6), a discharger may use an alternate sampling point located downstream of the sampling point established on the stream and specified for the plant under this Regulation but before the point of discharge of the stream to surface water or to an industrial sewer used in common with another plant.

(8) Before using an alternate sampling point under subsection (7), a discharger shall give the Director a written notice setting out the name, number and location of the alternate sampling point, together with a plot plan showing the alternate sampling point.

(9) Each discharger shall, for each batch of process effluent that flows past a process effluent batch sampling point at the discharger's plant, collect a composite sample from the process effluent batch sampling point and analyze the sample for the parameter pH.

(10) Each composite sample collected under subsection (9) shall be picked up over the period during which the batch of process effluent flows past the process effluent batch sampling point.

Monitoring - Cooling Water Effluent - Weekly Assessment

24. Each discharger shall, on one day in each week, on the day on which samples are picked up at the plant under section 19 for the week, pick up a set of samples collected at each cooling water effluent sampling point at the discharger's plant and shall analyze each set of samples for each assessment parameter.

Monitoring - Combined Effluent - Weekly Assessment

25. Each discharger shall, on one day in each week, on the day on which samples are picked up at the plant under section 19 for the week, pick up a set of samples collected at each combined effluent sampling point at the discharger's plant and shall analyze each set of samples for each assessment parameter.

Monitoring - Cooling Water Effluent and Combined Effluent - pH and Specific Conductance Measurement

26.-(1) Each discharger shall, on one day in each week, on the day on which samples are picked up at the plant under section 19 for the week, collect a grab sample from each cooling water effluent sampling point at the discharger's plant, during the time period applicable under subsection 17(4) or (5) to composite samples at the plant, and analyze each sample for the parameter pH.

(2) Each discharger shall, within the twenty-four hour period beginning with the collection of the first grab sample at the plant under subsection (1) for the week, collect two more grab samples from each cooling water effluent sampling point at the discharger's plant and shall analyze each sample for the parameter pH.

(3) There shall be an interval of at least four hours between each of the three collections at a sampling point under subsections (1) and (2) in each twenty-four hour period.

(4) Each grab sample collected under subsections (1) and (2) shall be picked up within twenty-four hours of when it was collected.

(5) Instead of complying with subsections (1) to (4) with respect to a sampling point on a stream, a discharger may use an on-line analyzer at the sampling point on the stream and analyze the effluent at the sampling point for the parameter pH on one day in each week, on the day on which samples are picked up at the plant under section 19 for the week, during the time period applicable under subsection 17(4) or (5) to composite samples at the plant, and two more times in each twenty-four hour period beginning with the first analysis at the plant under this subsection for the week.

(6) There shall be an interval of at least four hours between each of the three analyses at a sampling point under subsection (5) in each twenty-four hour period.

(7) Subsections (1) to (6) apply with necessary modifications to each combined effluent sampling point and, for the purpose, the reference in subsections (1) and (2) to each cooling water effluent sampling point shall be deemed to be a reference to each combined effluent sampling point.

(8) Subsections (1) to (7) apply with necessary modifications to the parameter specific conductance and, for the purpose, a reference in those subsections to pH shall be deemed to be a reference to specific conductance.

PART VI - MONITORING - ACUTE LETHALITY AND CHRONIC TOXICITY

Monitoring - Acute Lethality Testing - Rainbow Trout

27.-(1) Where a discharger is required by this section to perform a rainbow trout acute lethality test, the discharger shall perform the test according to the procedures described in the Environment Canada publication entitled "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout", dated July, 1990.

(2) Each rainbow trout acute lethality test required by this section shall be carried out as a single concentration test using one hundred percent effluent.

(3) On one day in each month, on a day on which samples are picked up at the plant under section 19, each discharger shall collect and immediately pick up a grab sample at each process effluent sampling point at the discharger's plant and shall perform a rainbow trout acute lethality test on each sample.

(4) There shall be an interval of at least fifteen days between successive pick-up days at the plant under subsection (3).

(5) All samples picked up under subsection (3) in a month shall be picked up on the same day in the month.

(6) Where a discharger has performed tests under subsection (3) for twelve consecutive months on samples collected from the same sampling point and the mortality of the rainbow trout in each test did not exceed fifty percent, the discharger is relieved of the obligations under subsection (3) relating to the sampling point and shall instead collect and immediately pick up a grab sample at the sampling point on one day in each quarter and perform a rainbow trout acute lethality test on each sample.

(7) Samples picked up at a plant under subsection (6) shall be picked up on a day on which samples are picked up at the plant under subsection (3).

(8) If no samples are being picked up at a plant under subsection (3) during a quarter, samples picked up at the plant during the quarter under subsection (6) shall be picked up on a day on which samples are picked up at the plant under section 19.

(9) There shall be an interval of at least forty-five days between successive pick-up days at the plant under subsection (6).

(10) All samples picked up under subsection (6) in a quarter shall be picked up on the same day in the quarter.

(11) If a rainbow trout acute lethality test performed under subsection (6) on any sample from a sampling point results in mortality of more than fifty percent of the test rainbow trout, subsections (6) to (10) cease to apply in respect to samples from that sampling point, and a discharger shall instead comply with the requirements of subsection (3) relating to the sampling point, until the tests performed under subsection (3) on all samples collected from the sampling point for a further twelve consecutive months result in mortality for no more than fifty per cent of the rainbow trout for each test.

(12) Subsections (2) to (11) apply with necessary modifications to each cooling water effluent sampling point and, for the purpose, the reference in subsection (3) to each process effluent sampling point shall be deemed to be a reference to each cooling water effluent sampling point and the reference in subsections (3) and (8) to section 19 shall be deemed to be a reference to subsection 24(1).

(13) Subsections (2) to (11) apply with necessary modifications to each combined effluent sampling point and, for the purpose, the reference in subsection (3) to each process effluent sampling point shall be deemed to be a reference to each combined effluent sampling point and the reference in subsections (3) and (8) to section 19 shall be deemed to be a reference to subsection 25(1).

(14) For each process effluent batch sampling point at the discharger's plant the discharger shall, on one day in each month, on a day on which samples are picked up at the plant under section 21 at the process effluent batch sampling point, collect and immediately pick up a grab sample at the process effluent batch sampling point, and perform a rainbow trout acute lethality test on the sample.

(15) Where a discharger has performed twelve consecutive tests under subsection (14) on samples collected from the same sampling point and the mortality of the rainbow trout in each test did not exceed fifty percent, the discharger is relieved of the obligations under subsection (14) relating to the sampling point and shall instead collect and immediately pick up a grab sample at the sampling point on one day in each quarter, on a day on which samples are picked up at the plant under section 21 at the sampling point, and perform a rainbow trout acute lethality test on the sample.

(16) If a rainbow trout acute lethality test performed under subsection (15) on any sample from a sampling point results in mortality of more than fifty percent of the test rainbow trout, subsection (15) ceases to apply in respect to samples from that sampling point, and a discharger shall instead comply with the requirements of subsection (14) relating to the sampling point, until the tests performed under subsection (14) on all samples collected from the sampling point for a further twelve consecutive tests result in mortality for no more than fifty per cent of the rainbow trout for each test.

(17) A discharger shall notify the Director in writing of any change in the frequency of acute lethality testing under this Regulation at the discharger's plant, within thirty days after the day on which the change begins.

(18) A discharger may notify the Director in writing of any period in which the testing of samples collected at a sampling point under this section would always result in mortality of more than fifty percent of the test rainbow trout.

(19) Where a notice is given under subsection (18), a discharger is relieved of the obligations under this section relating to the sampling point during the period in which the testing of samples collected at the sampling point would always result in mortality of more than fifty percent of the test rainbow trout.

(20) Subsections (18) and (19) are revoked on _____, 19__.
(The date that is 3 years after the day on which this Regulation is filed will be inserted in subsection 27(20)).

Monitoring - Acute Lethality Testing - Daphnia magna

28.-(1) Where a discharger is required by this section to perform a Daphnia magna acute lethality test, the discharger shall perform the test according to the procedures described in the Environment Canada publication entitled "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna", dated July, 1990.

(2) Subsections 27(2) to (20) apply with necessary modifications to Daphnia magna acute lethality tests and, for the purpose, a reference to rainbow trout shall be deemed to be a reference to Daphnia magna.

(3) Each discharger shall pick up each set of samples required to be collected from a sampling point at the discharger's plant under this section on a day on which the discharger collects a sample from the sampling point under section 27, to the extent possible having regard to the frequency of monitoring required at the sampling point under this section and section 27.

Assessment Monitoring - Acute Lethality

29.-(1) If a rainbow trout acute lethality test performed under section 27 on a sample picked up at a Schedule 2 or a Schedule 3 sampling point results in mortality of more than 50 percent of the test rainbow trout three times in twelve consecutive months, a discharger shall prepare a Rainbow Trout Toxicity Elimination Report.

(2) If a Daphnia magna lethality test performed under section 28 on a sample picked up at a Schedule 2 or a Schedule 3 sampling point results in mortality of more than 50 percent of the test Daphnia magna three times in twelve consecutive months, the discharger shall prepare a Daphnia magna Toxicity Elimination Report.

(3) For the purposes of this section, a Rainbow Trout or Daphnia magna Toxicity Elimination Report shall set out the following information:

1. A description of the studies carried out by the discharger for determining the sources and causes of the acute lethality

2. A detailed description of the methods by which the acute lethality could be eliminated, and an identification of which methods are technically feasible for implementing at the discharger's plant.

3. An estimate of the financial cost to the discharger of implementing each method identified as technically feasible under paragraph 2.

4. The timetable that would be required to implement each method identified as technically feasible under paragraph 2 and each of the stages involved in the implementation of each method.

(4) A Toxicity Elimination Report prepared under this section shall be submitted to the Director within twelve months of the date on which the third failed test was conducted that resulted in mortality of more than 50 percent of the test rainbow trout or Daphnia magna, as the case may be.

Monitoring - Chronic Toxicity Testing - Fathead Minnow and Ceriodaphnia dubia

30.-(1) Where a discharger is required to perform a 7-day fathead minnow growth inhibition test, the discharger shall perform the test according to the procedure described in the Environment Canada publication entitled "Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows" dated February, 1992.

(2) Where a discharger is required to perform a 7-day Ceriodaphnia dubia reproduction inhibition and survivability test, the discharger shall perform the test according to the procedure described in the Environment Canada publication entitled "Biological Test Method: Test of Reproduction and Survival Using the Cladoceran Ceriodaphnia dubia", dated February, 1992.

(3) On one day in each semi-annual period, on a day on which samples are picked up at the plant under section 19, each discharger shall collect and immediately pick up a grab sample from each sampling point designated in Schedule 6 at the discharger's plant, and shall perform a 7-day fathead minnow growth inhibition test and a 7-day Ceriodaphnia dubia reproduction inhibition and survivability test on each sample.

(4) There shall be an interval of at least ninety days between successive pick-up days at the plant under subsection (3).

(5) All samples picked up under subsection (3) in a semi-annual period shall be picked up on the same day in the semi-annual period.

(6) A discharger need not collect a sample from a sampling point in accordance with this section until twelve consecutive monthly rainbow trout acute lethality tests and twelve consecutive monthly Daphnia magna acute lethality tests performed on samples collected at the sampling point at a discharger's plant result in mortality for no more than fifty percent of the test organisms in one hundred percent effluent.

PART VII - EFFLUENT VOLUME

Flow Measurement

31.-(1) Subject to subsection (5), for the purposes of this section, a volume of effluent for a stream for a day is the volume that flowed past the sampling point on the stream during the twenty-four hour period preceding the pick-up of the first sample picked up from the stream for the day.

(2) Each discharger shall determine in cubic metres a daily volume of effluent for each process effluent monitoring stream at the discharger's plant for each day on which a sample is collected under this Regulation from the stream, by integration of continuous flowrate measurements.

(3) Despite subsection (2), where a process effluent monitoring stream discharges on an intermittent basis, the daily volumes for the stream may be determined either by integration of continuous flowrate measurements or by the summation of the individual intermittent volume measurements.

(4) Each discharger shall use flow measurement methods that allow the daily volumes for process effluent monitoring streams to be determined to an accuracy of within plus or minus fifteen percent.

(5) For the purposes of subsection (6), a batch volume of effluent for a process effluent batch monitoring stream is the volume that flowed past the process effluent batch sampling point on the stream during the period of flow of the batch of effluent past the sampling point.

(6) Each discharger shall determine in cubic metres a batch volume of effluent for each process effluent batch monitoring stream at the discharger's plant for each batch for which a sample is collected under this Regulation from the stream, by integration of continuous flowrate measurements.

(7) Each discharger shall use flow measurement methods that allow the batch volumes for process effluent batch monitoring streams to be determined to an accuracy of within plus or minus fifteen percent.

(8) Each discharger shall determine in cubic metres a daily volume of effluent for each cooling water effluent monitoring stream at the discharger's plant for each day on which a sample is collected under this Regulation from the stream.

(9) Each discharger shall use flow measurement methods that allow the daily volumes for cooling water effluent monitoring streams to be determined to an accuracy of within plus or minus twenty percent.

(10) Each discharger shall determine in cubic metres a daily volume of effluent for each combined effluent monitoring stream at the discharger's plant for each day on which a sample is collected under this Regulation from the stream.

(11) Each discharger shall use flow measurement methods that allow the daily volumes for combined effluent monitoring streams to be determined to an accuracy of within plus or minus twenty percent.

(12) Each discharger shall, no later than the day that this section comes into force, determine by calibration or confirm by means of a certified report of a registered professional engineer of the Province of Ontario that,

(a) each flow measurement method used under subsections (2) and (3) meets the accuracy requirements of subsection (4);

(b) each flow measurement method used under subsection (6) meets the accuracy requirements of subsection (7);

(c) each flow measurement method used under subsection (8) meets the accuracy requirements of subsection (9); and

(d) each flow measurement method used under subsection (10) meets the accuracy requirements of subsection (11).

(13) Where a discharger uses a new flow measurement method or alters an existing flow measurement method, the discharger shall determine by calibration or confirm by means of a certified report of a registered professional engineer of the Province of Ontario that each new or altered flow measurement method meets the accuracy requirements of subsections (4), (7), (9) or (11), as the case may be, within two weeks after the day on which the new or altered method or system is used.

(14) Each discharger shall develop and implement a maintenance schedule and a calibration schedule for each flow measurement system installed at the discharger's plant and shall maintain each flow measurement system according to good operating practices.

(15) Each discharger shall use reasonable efforts to set up each flow measurement system used for the purposes of this section in a way that permits inspection by a provincial officer.

Calculation of Plant Volumes

32.-(1) Each discharger shall calculate, in cubic metres, a daily process effluent plant volume for each day.

(2) For the purposes of subsection (1), a process effluent plant volume for a day is the sum of the daily process effluent volumes determined under section 31 for the day.

(3) Each discharger shall calculate, in cubic metres, a monthly average process effluent plant volume for each month, by taking the arithmetic mean of the daily process effluent plant volumes calculated under subsection (1) for the month.

(4) Each discharger shall calculate, in cubic metres, a daily cooling water effluent plant volume for each day.

(5) For the purposes of subsection (4), a cooling water effluent plant volume for a day is the sum of the daily cooling water volumes determined under section 31 for the day.

(6) Each discharger shall calculate, in cubic metres, a monthly average cooling water effluent plant volume for each month, by taking the arithmetic mean of the daily cooling water effluent plant volumes calculated under subsection (4) for the month.

(7) Each discharger shall calculate, in cubic metres, a daily combined effluent plant volume for each day.

(8) For the purposes of subsection (7), a combined effluent plant volume for a day is the sum of the daily combined effluent volumes determined under section 31 for the day.

(9) Each discharger shall calculate, in cubic metres, a monthly average combined effluent plant volume for each month, by taking the arithmetic mean of the daily combined effluent plant volumes calculated under subsection (7) for the month.

PART VIII - STORM WATER CONTROL

Storm Water Control Study

33.-(1) Each discharger shall complete a storm water control study in respect of the discharger's plant, in accordance with the requirements of the Ministry of Environment and Energy publication entitled "Protocol for Conducting a Storm Water Control Study", dated August, 1994.

(2) A discharger need not comply with subsection (1) in respect of the discharger's plant if,

(a) the plant meets the exemption criteria set out in the Ministry of Environment and Energy publication entitled "Protocol for Conducting a Storm Water Control Study," dated August, 1994; and

(b) the discharger notifies the Director in writing, by ______________, 19__, that the plant meets the exemption criteria referred to in clause (a).

(The date that is one year after the day on which this Regulation is filed will be inserted in clause 33(2)(b)).

(3) Subject to subsection (4), a discharger shall complete the storm water control study in respect of the discharger's plant by ________, 19__.

(The date that is two years after the day on which this Regulation is filed will be inserted in subsection 33(3)).

(4) A discharger may postpone completion of the storm water control study in respect of the discharger's plant until _______, 19__ if,

(a) in order to meet the requirements of Part IV, the discharger plans to make process changes, install waste water treatment facilities, implement management practices, or make any other changes at the plant that would likely alter the quantity or quality of storm water discharged from the plant; and

(b) the discharger notifies the Director in writing, by ________, 19__, of the plans referred to in clause (a).

(The date that is two years after the day on which this Regulation is filed will be inserted in clause 33(4)(b)).

(5) Each discharger shall ensure that a copy of each study completed under this section is available to Ministry staff at the discharger's plant, on request during the plant's normal office hours.

PART IX - RECORDS AND REPORTS

Record Keeping

34.-(1) Each discharger shall keep records, in an electronic format acceptable to the Director, of all analytical results obtained under sections 18 to 21 and 23 to 26, all calculations performed under sections 10, 11, 12, 13 and 14, and all determinations and calculations made or performed under sections 31 and 32.

(2) Each discharger shall keep records of all sampling and analytical procedures used in meeting the requirements of section 7, including, for each sample, the date, the time of pick-up, the sampling procedures used, and any incidents likely to affect the analytical results.

(3) Each discharger shall keep records of the results of all monitoring performed under sections 22, 27, 28 and 30.

(4) Each discharger shall keep records of all maintenance and calibration procedures performed under section 31.

(5) Each discharger shall keep records of all problems or malfunctions, including those related to sampling, analysis, acute lethality testing, chronic toxicity testing or flow measurement, that result or are likely to result in a failure to comply with a requirement of this Regulation, stating the date, duration and cause of each malfunction, and including a description of any remedial action taken.

(6) Each discharger shall keep records of any incident in which process effluent is discharged from the discharger's plant without flowing past a process effluent sampling point or a process effluent batch sampling point at the plant before being discharged, stating the date, duration, cause and nature of each incident.

(7) Each discharger shall keep records of all process changes and redirections of or changes in the character of effluent streams that affect the quality of effluent at any sampling point specified for the discharger's plant under this Regulation.

(8) Beginning on ________, 19___, each discharger shall keep records of the monthly average daily production, in tonnes, of each product listed in Schedule 7 for the discharger's plant, for each month.

(The day that is the first day of the month after the month on which the Regulation comes into force will be inserted in subsection (8)).

(9) For the purposes of subsection (8), the monthly average daily production of a product for a month at the discharger's plant is the amount of the product, calculated in tonnes, that is produced at the discharger's plant during the month, divided by the number of days in the month in which the product is produced at the plant.

(10) Each discharger shall keep records of the reference daily rate of production, in tonnes, of each product listed in Schedule 7 for the discharger's plant.

(11) For the purposes of subsection (10), the reference daily rate of production of a product at the discharger's plant is the arithmetic mean of the amounts calculated under subsection (8) for the product for the first twelve months for which the discharger is required to keep a record under subsection (8).

(12) Subject to subsection (13), each discharger shall make each record required by this section as soon as reasonably possible and shall keep each such record for a period of three years.

(13) Each discharger shall keep each record required by subsection (10) for a period of ten years.

(14) Each discharger shall ensure that all records kept under this section are available to Ministry staff at the discharger's plant, on request during the plant's normal office hours.

Reports Available to the Public

35.-(1) On or before June 1 in each year, each discharger shall prepare a report relating to the previous calendar year and including,

(a) a summary of plant loadings calculated under sections 10, 12 and 13;

(b) a summary of batch loadings calculated under section 11;

(c) a summary of process effluent loading contributions calculated under section 14;

(d) a summary of the results of monitoring performed under sections 18 to 21, 23 to 28 and 30;

(e) a summary of calculations performed under subsections 32(1), (4) and (7);

(f) a summary of the loadings, concentrations or other results that exceeded a limit prescribed by section 15 or 16; and

(g) a summary of the incidents in which process effluent was discharged from the discharger's plant without flowing past a process effluent sampling point or a process effluent batch sampling point at the plant before being discharged.

(2) Each discharger shall ensure that each report prepared under subsection (1) is available to any person at the discharger's plant, on request during the plant's normal office hours.

(3) Each discharger shall provide the Director, upon request, with a copy of any report that the discharger has prepared under subsection (1).

Reports to the Director - General

36.-(1) Each discharger shall notify the Director in writing of any change of name or ownership of the discharger's plant occurring after _______, 19___, within thirty days after the end of the month in which the change occurs.

(The date that is the day on which this Regulation is filed will be inserted in subsection 36(1)).

(2) Each discharger shall notify the Director in writing of any process change or redirection of or change in the character of an effluent stream that affects the quality of effluent at any sampling point specified for the discharger's plant under this Regulation, within thirty days of the change or redirection.

(3) A discharger need not comply with subsection (2) where the effect of the change or redirection on effluent quality is of less than one week's duration.

(4) Each discharger shall notify the Director in writing if the discharger's plant has, for three consecutive months, produced a product listed in Schedule 7 for the discharger's plant at less than seventy-five percent of the reference daily rate of production calculated under subsection 34(10) for the product, within thirty days after the end of the three month period.

Reports to the Director - Compliance with Section 6 and Part IV

37.-(1) Each discharger shall report to the Director any incident in which process effluent is discharged from the discharger's plant without flowing past a process effluent sampling point or a process effluent batch sampling point at the plant before being discharged.

(2) Each discharger shall report any loading, concentration or other result that exceeds a limit prescribed by section 15 or 16.

(3) A report required under subsection (1) or (2) shall be given orally, as soon as reasonably possible, and in writing, as soon as reasonably possible.

Quarterly Reports to the Director

38.-(1) No later than forty-five days after the end of each quarter, each discharger shall submit a report to the Director containing information relating to the discharger's plant throughout the quarter as required by subsections (3) to (14).

(2) A report under this section shall be submitted both in an electronic format acceptable to the Director and in hard copy generated from the electronic format and signed by the discharger.

(3) A report under this section shall include all information included in a report given under section 37 during the quarter.

(4) Each discharger shall report, for each month in the quarter, the monthly average plant loadings and the highest and lowest daily plant loadings calculated under section 10, 12 and 13 for each limited parameter and each assessment parameter.

(5) Each discharger shall report, for each month in the quarter, the highest and lowest batch loadings calculated under section 11 for each limited parameter.

(6) Each discharger shall report, for each month in the quarter, the monthly average process effluent loading contributions and the highest and lowest daily process effluent loading contributions calculated under section 14 for each common parameter.

(7) Each discharger shall report, for each month in the quarter, the monthly average process effluent plant volume and the highest and lowest daily process effluent plant volumes calculated under section 32.

(8) Each discharger shall report, for each month in the quarter, the highest and lowest process effluent batch volumes calculated under section 31.

(9) Each discharger shall report, for each month in the quarter, the monthly average cooling water effluent plant volume and the highest and lowest daily cooling water effluent plant volumes calculated under section 32.

(10) Each discharger shall report, for each month in the quarter, the monthly average combined effluent plant volume and the highest and lowest daily combined effluent plant volumes calculated under section 32.

(11) Each discharger shall report, for each process effluent monitoring stream at the discharger's plant, the number of days in each month in the quarter in which process effluent flowed past the process effluent sampling point on the stream.

(12) Each discharger shall report, for each process effluent batch monitoring stream at the discharger's plant, the number of batches of process effluent in each month in the quarter that flowed past the process effluent batch sampling point on the stream.

(13) Each discharger shall report, for each month in the quarter, the highest and lowest pH results obtained under section 23 for each process effluent monitoring stream and each process effluent batch monitoring stream at the discharger's plant.

(14) Each discharger shall report, for each month in the quarter, the highest and lowest pH results and specific conductance results obtained under section 26 for each cooling water effluent monitoring stream and each combined effluent monitoring stream at the discharger's plant.

Reports to the Director - Chronic Toxicity Testing

39.-(1) Each discharger shall report to the Director the results of all monitoring performed under section 30, together with the date on which each sample was picked up, no later than forty-five days after the end of each semi-annual period in which the monitoring was performed.

(2) A report under subsection (1) shall include a plot of percentage reduction in growth or reproduction against the logarithm of test concentration and shall include a calculation of the concentration at which a 25 per cent reduction in growth or reproduction would occur.

PART X - COMMENCEMENT AND REVOCATION PROVISIONS

Revocation of O.Reg. **395/89**

40. Ontario Regulations 395/89 and 649/89 are revoked on _______, 19__.

(The date that is 90 days after the day on which this Regulation is filed will be inserted in section 40).

Commencement of Parts IV, V, VI and VII

41.-(1) Part IV comes into force on ______, 19__.

(The date that is 3 years after the day on which this Regulation is filed will be inserted in subsection 41(1)).

(2) Parts V, VI and VII come into force on _______, 19__.

(The date that is 90 days after the day on which this Regulation is filed will be inserted in subsection 41(2)).

SCHEDULE 1
LIST OF REGULATED PLANTS

PLANT NAME	LOCATION	OWNER AS OF May, 1994
Albright and Wilson Americas	Port Maitland	Albright and Wilson Americas Inc.
Cabot Canada Ltd.	Sarnia	Cabot Canada Ltd.
Columbian Chemicals Ltd.	Hamilton	Columbian Chemicals Ltd.
Cytec Canada Inc. (Welland plant)	Niagara Falls	Cyanamid Canada Inc.
The Exolon-ESK Company of Canada Ltd.	Thorold	The Exolon-ESK Company of Canada Ltd.
ETI Explosives Technologies International	North Bay	ETI Explosives Technologies International (Canada) Ltd.
General Chemical Canada Ltd.	Amherstburg	General Chemical Canada Ltd.
ICI Canada Inc.	Cornwall	ICI Canada Inc.
ICI Canada Inc. - Conpak	Cornwall	Stanchem, Division of ICI Canada Inc.
International Minerals and Chemicals Corporation (Canada) Limited	Port Maitland	International Minerals and Chemicals Corporation (Canada) Limited
Liquid Carbonic Inc.	Courtright	Liquid Carbonic Inc.
Liquid Carbonic Inc.	Maitland	Liquid Carbonic Inc.
Norton Advanced Ceramics of Canada Inc.	Niagara Falls	Norton Advanced Ceramics of Canada Inc.
Nutrite Inc.	Maitland	Nutrite Inc./Imasco
Partek Insulations Ltd.	Sarnia	Partek Insulations Ltd.
Praxair Canada Inc.	Mooretown	Praxair Canada Inc.
Praxair Canada Inc.	Sarnia	Praxair Canada Inc.
Praxair Canada Inc.	Sault Ste. Marie	Praxair Canada Inc.
Puritan Bennett Corporation	Maitland	Puritan Pennett Corporation
Sulco Chemicals Limited	Elmira	Sulco Chemicals Limited
Terra Industries (Canada) Inc.	Courtright	Terra Industries Inc.
UCAR Carbon Canada Inc.	Welland	Union Carbide Canada Inc.
Washington Mills Electro Minerals Corporation	Niagara Falls	Washington Mills Electro Minerals Corporation
Washington Mills Limited	Niagara Falls	Washington Mills Limited
Welland Chemical Limited	Sarnia	Welland Chemical Limited

Schedule 2

Process Effluent Limits and Monitoring Frequency

PLANT: Albright and Wilson Americas Inc. (Port Maitland)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	210	30
6	Total phosphorus	D	2.4	0.93
8	Total suspended solids	D	170	48
12	Mercury	Q	0.0025	-
14	Phenolics	W	0.12	0.048

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated____, 19__, and filed with the Ministry.

0100 = Final Discharge to River

Process Effluent Limits and Monitoring Frequency

PLANT: Cabot Canada Ltd. (Sarnia)

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
4	Nitrate+Nitrite	Q	3.2	-
5	DOC	W	29	10
6	Total phosphorus	Q	0.87	-
8	Total suspended solids	D	48	15
9	Aluminum	W	3.5	2.2
9	Zinc	Q	1.4	-
25	Oil and grease	Q	17	-
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Discharge from Filter Bed to Cole Drain

Process Effluent Limits and Monitoring Frequency

PLANT: Cytec Canada Inc. (Welland Plant)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
2	Cyanide Total	W	0.13	0.05
4	Ammonia plus Ammonium	W	10	3.4
4	Nitrate + Nitrite	W	32	10
4	Total Kjeldahl nitrogen	W	9.7	3.6
5	DOC	W	75	27
6	Total phosphorus	D	5.0	1.9
7	Total suspended solids	D	150	21
17	Toluene	W	0.12	0.046
25	Oil and grease	Q	8.4	-
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0400 = Sludge Pond #11 to Miller's Creek

Process Effluent Limits and Monitoring Frequency

PLANT: The Exolon-Esk Company of Canada Ltd. (Niagara Falls)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	99	14
6	Total phosphorus	W	2.8	1.0
8	Total suspended solids	D	160	79
9	Aluminum	W	2.6	1.1

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = 24 Inch Outfall at Beaver Dam Road

Process Effluent Limits and Monitoring Frequency

PLANT: General Chemical Canada Ltd. (Amherstburg)

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
2	Cyanide Total	Q	6.3	-
4	Ammonia plus Ammonium	W	2900	650
4	Nitrate + Nitrite	Q	750	-
4	Total Kjeldahl nitrogen	W	2400	890
5	DOC	W	2900	1200
6	Total phosphorus	Q	64	-
8	Total suspended solids	D	43,000	10,500
9	Molybdenum	Q	10	-
10	Arsenic	Q	1.9	-
12	Mercury	Q	0.016	-
15	Sulphide	Q	6.3	-
16	Chloroform	Q	0.24	-
25	Oil and grease	Q	1400	-
I1	Chloride	W	1,200,000	950,000
I2	Fluoride	W	60	46
I3	Sulphate	M	37,000	28,000
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: ICI Canada Inc. (Cornwall)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
4	Nitrate + Nitrite	Q	0.90	-
5	DOC	W	9.6	4.2
6	Total phosphorus	Q	1.1	-
8	Total suspended solids	D	24	4.3
9	Aluminum	W	0.43	0.078
9	Copper	Q	0.016	-
9	Lead	Q	0.23	-
9	Nickel	Q	0.010	-
9	Zinc	Q	0.056	-
10	Arsenic	Q	0.0050	-
12	Mercury	D	0.0058	0.0012
14	Phenolics (4AAP)	Q	0.0042	-
23	1,2,4-Trichlorobenzene	W	0.00034	0.00013
23	Hexachlorobenzene	W	0.00016	0.000060
23	Hexachlorobutadiene	W	0.00029	0.00010
23	Hexachloroethane	W	0.0011	0.00040
23	Octachlorostyrene	Q	0.000070	-
23	Pentachlorobenzene	Q	0.000010	-
25	Oil and grease	Q	6.7	-
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:
ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement
Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.
0400 = Effluent in Manhole #15

Process Effluent Limits and Monitoring Frequency

PLANT: ICI Canada Inc - Conpak (Cornwall)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	W	0.29	0.10
4	Nitrate + Nitrite	W	0.68	0.15
4	Total Kjeldahl nitrogen	W	0.29	0.11
5	DOC	W	1.4	0.30
6	Total phosphorus	W	0.15	0.023
8	Total suspended solids	D	3.5	0.60
9	Aluminum	W	0.14	0.022
9	Cadminum	W	0.00024	0.000060
9	Chrominum	W	0.029	0.0046
9	Copper	W	0.0071	0.0012
9	Lead	W	0.014	0.0018
9	Nickel	W	0.063	0.0012
9	Zinc	W	0.0010	0.00020
10	Antimony	W	0.00020	0.000070
10	Arsenic	Q	0.00060	-
10	Selenium	Q	0.0014	-
12	Mercury	W	0.00030	0.000060
14	Phenolics (4AAP)	W	0.00063	0.00017
16	Carbon tetrachloride	W	0.0029	0.0011
16	Chloroform	W	0.0080	0.00016

Continued on next page

Process Effluent Limits and Monitoring Frequency

PLANT: ICI Canada Inc - Conpak (Cornwall)

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
23	1,2,3-Trichlorobenzene	Q	0.0000040	-
23	1,2,4-Trichlorobenzene	Q	0.0000030	-
23	Hexachlorobenzene	W	0.000040	0.000010
23	Hexachlorobutadiene	Q	0.0000050	-
23	Hexachloroethane	W	0.00020	0.000070
25	Oil and grease	Q	0.68	-
30	Chloride	W	170	43
30	Sulphate	W	120	18
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Effluent from Conpak to the River

Process Effluent Limits and Monitoring Frequency

PLANT: International Minerals and Chemicals Ltd. (Port Maitland)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	Q	41	-
4	Nitrate + Nitrite	Q	25	-
4	Total Kjeldahl nitrogen	Q	30	-
5	DOC	Q	68	-
6	Total phosphorus	D	7.9	4.5
8	Total suspended solids	D	250	51
14	Phenolics (4AAP)	Q	0.16	-
25	Oil and grease	Q	10	-
12	Fluoride	D	76	57
13	Sulphate	Q	13,000	-

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = Final Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT: Liquid Carbonic Inc. (Courtright)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	310	74
6	Total phosphorus	Q	1.9	-
8	Total suspended solids	D	97	49
9	Aluminum	W	1.6	0.62
25	Oil and grease	W	77	27

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Effluent to South Ditch

Process Effluent Limits and Monitoring Frequency

PLANT: Liquid Carbonic Inc. (Maitland)

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
4	Nitrate + Nitrite	W	22	15
5	DOC	W	190	46
6	Total phosphorus	Q	0.87	-
8	Total suspended solids	D	44	22
25	Oil and grease	W	35	13

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Effluent to Main Outfall to River

Process Effluent Limits and Monitoring Frequency

PLANT: Norton Advanced Ceramics of Canada Inc. (Niagara Falls)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	34	16
6	Total phosphorus	Q	2.4	-
8	Total suspended solids	D	450	100
9	Aluminum	W	15	3.9
25	Oil and grease	Q	24	-
I3	Sulphate	W	1900	770

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: Nutrite Inc. (Maitland)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	D	16	2.5
4	Nitrate + Nitrite	D	37	5.9
4	Total Kjeldahl nitrogen	D	16	1.3
5	DOC	W	21	11
6	Total phosphorus	W	7.9	0.80
8	Total suspended solids	D	42	9.0
9	Aluminum	W	1.6	0.28
9	Copper	Q	0.10	-
9	Vanadium	Q	0.86	-
9	Zinc	W	0.10	0.021
12	Mercury	Q	0.00045	-
14	Phenolics (4AAP)	W	0.0063	0.0027
16	Tetrachloroethylene	Q	0.11	-
25	Oil and grease	W	8.7	3.7
27	PCBT	Q	0.00030	-
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:
ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement
Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0400 = Final Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT: Praxair Canada Inc. (Mooretown)

ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	1.1	0.17
6	Total phosphorus	W	0.095	0.015
8	Total suspended solids	D	0.90	0.14
9	Aluminum	W	0.014	0.0052
9	Copper	Q	0.0038	-
9	Zinc	W	0.020	0.0066
25	Oil and grease	W	0.11	0.047
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Final Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT: Praxair Canada Inc. (Sarnia)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	1.3	0.42
6	Total phosphorus	W	0.24	0.043
8	Total suspended solids	D	2.8	0.46
9	Aluminum	W	0.058	0.022
9	Copper	W	0.0070	0.0031
9	Zinc	W	0.013	0.0065
25	Oil and grease	W	0.33	0.14
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Effluent from Cooling Towers to Cole Drain

Process Effluent Limits and Monitoring Frequency

PLANT: Praxair Canada Inc. (Sault Ste. Marie)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	9.0	2.9
6	Total phosphorus	W	1.7	0.30
8	Total suspended solids	D	20	3.3
9	Aluminum	W	0.42	0.15
9	Copper	W	0.045	0.020
9	Zinc	W	0.090	0.046
25	Oil and grease	W	2.1	0.92
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	Q		
	2,3,7,8-tetrachlorodibenzofuran	Q		
	TEQ	Q		

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Outfall at Safety Drive to River

Process Effluent Limits and Monitoring Frequency

PLANT: Puritan Bennett Corporation (Maitland)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	W	3.9	1.3
4	Nitrate + Nitrite	W	2.9	1.8
4	Total Kjeldahl nitrogen	W	3.1	1.2
5	DOC	W	1.6	1.0
6	Total phosphorus	Q	0.11	-
8	Total suspended solids	D	5.4	2.7

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Effluent to Creek

Process Effluent Limits and Monitoring Frequency

PLANT: Sulco Chemicals Limited (Elmira)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
2	Cyanide Total	Q	0.014	-
5	DOC	W	1.4	0.63
6	Total phosphorus	W	0.20	0.082
8	Total suspended solids	D	2.9	1.2
9	Aluminum	Q	0.085	-
9	Cadminum	Q	0.0016	-
9	Copper	Q	0.013	-
9	Nickel	Q	0.022	-
9	Vanadium	Q	0.040	-
9	Zinc	Q	0.075	-
10	Arsenic	Q	0.0014	-
14	Phenolics (4AAP)	Q	0.0024	-
25	Oil and grease	Q	0.96	-
11	Chloride	W	270	140
12	Fluoride	W	1.6	0.42
13	Sulphate	W	610	150

Explanatory Notes:
ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement
Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Final Effluent to Creek

Process Effluent Limits and Monitoring Frequency

PLANT: Terra Industries (Canada) Inc. (Courtright)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
4	Ammonia plus Ammonium	D	290	140
4	Nitrate + Nitrite	D	650	150
4	Total Kjeldahl nitrogen	D	540	250
5	DOC	W	1100	510
6	Total phosphorus	Q	46	-
8	Total suspended solids	D	3500	880
9	Aluminum	Q	8.9	-
9	Zinc	Q	12	-
14	Phenolics (4AAP)	W	7.4	2.6
12	Fluoride	Q	4.0	-
13	Sulphate	Q	2700	-

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: UCAR Carbon Canada Inc. (Welland)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit kg/day	Monthly Average Plant Loading Limit kg/day
	Column 1	Column 2	Column 3	Column 4
4	Nitrate + Nitrite	Q	1.3	-
5	DOC	W	6.4	1.2
6	Total phosphorus	Q	0.052	-
8	Total suspended solids	D	9.8	4.7
9	Aluminum	Q	0.64	-
9	Zinc	Q	0.10	-
14	Phenolics (4AAP)	Q	0.010	-
25	Oil and grease	Q	2.7	-
30	Chloride	Q	370	-
30	Sulphate	Q	1500	-

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0200 = Government Dock Effluent

Process Effluent Limits and Monitoring Frequency

PLANT: Washington Mills Electro Minerals Corporation (Niagara Falls)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	81	33
6	Total phosphorus	Q	2.2	-
8	Total suspended solids	D	190	61
9	Aluminum	W	2.8	1.3
25	Oil and grease	Q	19	-

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Limits and Monitoring Frequency

PLANT: Washington Mills Limited (Niagara Falls)				
ATG	Parameter	Monitoring Frequency	Daily Plant Loading Limit	Monthly Average Plant Loading Limit
			kg/day	kg/day
	Column 1	Column 2	Column 3	Column 4
5	DOC	W	24	7.8
6	Total phosphorus	Q	0.58	-
8	Total suspended solids	D	60	18
9	Aluminum	W	3.0	1.1
25	Oil and grease	W	14	5.8

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
D Daily monitoring requirement
W Weekly monitoring requirement
Q Quarterly monitoring requirement

Process Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Final Effluent to River

Process Effluent Limits and Monitoring Frequency

PLANT: Welland Chemical Limited (Sarnia)			
ATG	Parameter	Monitoring Frequency	Batch Loading Limit kg/batch
	Column 1	Column 2	Column 5
4	Nitrate + Nitrite	B	0.57
5	DOC	B	9.8
6	Total phosphorus	B	0.051
8	Total suspended solids	B	5.5
9	Aluminum	B	0.12
16	Chloroform	B	0.27

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
kg/day kilograms per day
B Process Effluent Batch - batch monitoring requirement

Process Effluent Batch Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0200 = Effluent from #1 Lagoon

Schedule 3
Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: General Chemical Canada Ltd. (Amherstburg)			
ATG	Parameter	Control Points	
		0100	0200
	Column 1	Column 2	Column 3
2	Cyanide Total	-	X
4	Ammonia plus Ammonium	X	X
4	Nitrate + Nitrite	-	X
4	Total Kjeldahl nitrogen	X	X
5	DOC	X	X
6	Total phosphorus	X	X
8	Total suspended solids	X	X
9	Molybdenum	X	-
10	Arsenic	X	-
12	Mercury	X	-
15	Sulphide	X	-
16	Chloroform	X	-
25	Oil and grease	X	X
I1	Chloride	X	X
I2	Fluoride	X	-
I3	Sulphate	X	X
24	2,3,7,8-tetrachlorodibenzo-para-dioxin	X	X
	2,3,7,8-tetrachlorodibenzofuran	X	X
	TEQ	X	X

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Process Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = North Drain Effluent to Detroit River
0200 = Main Drain Effluent to Detroit River

Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: Norton Advanced Ceramics of Canada Inc. (Niagara Falls)			
		Control Points	
ATG	Parameter	0300	0400
	Column 1	Column 2	Column 3
5	DOC	X	X
6	Total phosphorus	X	X
8	Total suspended solids	X	X
9	Aluminum	X	X
25	Oil and grease	X	X
13	Sulphate	X	-

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Process Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = Sewer C to Welland River
0400 = Sewer D to Welland River

Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: Terra Industries (Canada) Inc. (Courtright)

ATG	Parameter	Control Points			
		0300	0500	0700	0800
	Column 1	Column 2	Column 3	Column 4	Column 5
4	Ammonia plus Ammonium	X	X	X	X
4	Nitrate + Nitrite	X	X	X	X
4	Total Kjeldahl nitrogen	X	X	X	X
5	DOC	X	X	X	X
6	Total phosphorus	-	X	X	X
8	Total suspended solids	X	X	X	X
9	Aluminum	-	-	-	X
9	Zinc	-	X	-	X
14	Phenolics (4AAP)	X	X	X	X
12	Fluoride	-	X	-	-
13	Sulphate	-	X	-	X

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Process Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = Emergency Containment Basin Effluent flowing into Plant Final Discharge to St. Clair River
0500 = Effluent from 30 inch concrete pipe flowing into Plant Final Discharge to St. Clair River
0700 = Effluent in Manhole number 55 flowing into Plant Final Discharge to St. Clair River
0800 = Effluent in 42 inch line from A-11 flowing into Plant Final Discharge to St. Clair River

Process Effluent Sampling for Plants with More Than One Process Effluent Sampling Point

PLANT: Washington Mills Electro-Minerals Corporation (Niagara Falls)			
		Control Points	
ATG	Parameter	0100	0200
	Column 1	Column 2	Column 3
5	DOC	X	X
6	Total phosphorus	X	X
8	Total suspended solids	X	X
9	Aluminum	X	X
25	Oil and grease	X	X

Explanatory Notes:

ATG Analytical Test Group
TEQ total toxic equivalent of 2,3,7,8 substituted dioxin and furan congeners
X means that the corresponding parameter in Column 1 is specified for the sampling point and is required to be monitored at the sampling point

Process Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Effluent from Queen Lagoon to Welland River
0200 = Effluent from the Old Lagoon to Welland River

Schedule 4
Combined Effluent and Cooling Water Assessment

PLANT: Cytec Canada Inc. (Welland Plant)		
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
4	Ammonia plus Ammonium	W
4	Total Kjeldahl Nitrogen	W
4	Nitrate plus Nitrite	W
6	Total phosphorus	W
8	Total suspended solids	W
25	Oil and grease	W

Cooling Water Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = DICY Cooling Water to River (Cooling Water)

PLANT: ETI Explosives Technologies International Ltd. (North Bay)		
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
4	Ammonia plus Ammonium	W
4	Total Kjeldahl Nitrogen	W
4	Nitrate plus Nitrite	W
8	Total suspended solids	W
25	Oil and grease	W

Cooling Water Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = Discharge at Weir to Lake (Cooling Water)

Explanatory Notes:

ATG Analytical Test Group
W Weekly monitoring requirement

Combined Effluent and Cooling Water Assessment

PLANT:	ICI Canada Inc. (Cornwall)	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
8	Total suspended solids	W
25	Oil and grease	W

Cooling Water Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = Effluent in LEL-2 to River (Combined Effluent)

PLANT:	Partek Insulations Ltd. (Sarnia)	
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
8	Total suspended solids	W
25	Oil and grease	W

Cooling Water Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = Cooling Water Overflow Effluent (Cooling Water)

Explanatory Notes:

ATG Analytical Test Group
W Weekly monitoring requirement

Combined Effluent and Cooling Water Assessment

PLANT: Terra Industries (Canada) Inc. (Courtright)		
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
4	Ammonia plus Ammonium	W
4	Total Kjeldahl Nitrogen	W
4	Nitrate plus Nitrite	W
6	Total phosphorus	W
8	Total suspended solids	W
25	Oil and grease	W

Cooling Water Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0200 = Main Effluent to River (Combined Effluent)

PLANT: UCAR Carbon Canada Inc. (Welland)		
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
8	Total suspended solids	W
25	Oil and grease	W

Cooling Water Effluent Sampling Point Number, Name and Location as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0100 = #2 Weir Effluent to Canal (Cooling Water)

Explanatory Notes:

ATG Analytical Test Group
W Weekly monitoring requirement

Combined Effluent and Cooling Water Assessment

PLANT: Welland Chemical Limited (Sarnia)		
ATG	Parameter	Monitoring Frequency
	Column 1	Column 2
8	Total suspended solids	W
25	Oil and grease	W

Cooling Water Effluent Sampling Point Numbers, Names and Locations as set out in the plot plan of the discharger, dated ____, 19__, and filed with the Ministry.

0300 = Effluent from Chlorine Filling Unit (Cooling Water)
0400 = Effluent from East Wall of Aluminum Chloride Building (Cooling Water)
0500 = Effluent from South Wall of Aluminum Chloride Building (Cooling Water)

Explanatory Notes:

ATG Analytical Test Group
W Weekly monitoring requirement

SCHEDULE 5
DESIGNATED SAMPLING POINTS FOR LETHALITY LIMITS

PLANT NAME	*Sampling Point Number and Description
Albright and Wilson Americas	0100 = Final Discharge to River (Process Effluent)
Cabot Canada Ltd.	0100 = Discharge from Filter Bed to Cole Drain (Process Effluent)
Cytec Canada Inc. (Welland plant)	0400 = Sludge Pond #11 to Miller's Creek (Process Effluent) 0300 = DICY Cooling Water to River (Cooling Water)
The Exolon-ESK Company of Canada	0100 = 24 Inch Outfall at Beaver Dam Rd. (Process Effluent)
ETI Explosives Technologies International	0100 = Discharge at Weir to Lake (Cooling Water)
General Chemical Canada Ltd.	0200 = Main Drain Effluent to Detroit River (Process Effluent)
ICI Canada Inc.	0300 = Effluent in LEL-2 to River (Combined Effluent)
ICI Canada Inc. - Conpak	0100 = Effluent from Conpak to River (Process Effluent)
International Minerals and Chemicals Corporation (Canada) Limited	0300 = Final Effluent to River (Process Effluent)
Liquid Carbonic Inc. (Courtright)	0100 = Effluent to South Ditch (Process Effluent)
Liquid Carbonic Inc. (Maitland)	0100 = Effluent to River (Process Effluent)
Norton Advanced Ceramics of Canada Inc.	0300 = Sewer C to Welland River (Process Effluent) 0400 = Sewer D to Welland River (Process Effluent)
Nutrite Inc. (Maitland)	0400 = Final Effluent to River (Process Effluent)
Partek Insulations Ltd.	0300 = Cooling Water Overflow Effluent (Cooling Water)
Praxair Canada Inc. (Moore)	0100 = Final Effluent to River (Process Effluent)
Praxair Canada Inc. (Sarnia)	0100 = Effluent from Cooling Tower to Cole Drain (Process Effluent)
Praxair Canada Inc. (Sault Ste. Marie)	0100 = Outfall at Safety Drive to River (Process Effluent)
Puritan Bennett Corporation	0100 = Effluent to Creek (Process Effluent)
Sulco Chemical Limited	0100 = Final Effluent to Creek (Process Effluent)
Terra Industries (Canada) Inc.	0200 = Plant Final Effluent to the St. Clair River (Combined Effluent)
UCAR Carbon Canada Inc.	0100 = #2 Weir Effluent to Canal (Cooling Water) 0200 = Government Dock Effluent (Process Effluent)
Washington Mills Electro Minerals Corporation	0100 = Effluent from Queen Lagoon to Welland River (Process Effluent) 0200 = Effluent from the Old Lagoon to Welland River (Process Effluent)
Washington Mills Limited	0100 = Final Effluent to River (Process Effluent)
Welland Chemical Limited	0200 = Effluent from #1 Lagoon (Process Effluent) 0300 = Effluent from Chlorine Filling Unit (Cooling Water) 0400 = Effluent from East Wall of Aluminum Chloride Building (Cooling Water) 0500 = Effluent from South Wall of Aluminum Chloride Bldg (Cooling Water)

* - the designated sampling points for lethality limits are identified as to number, name and location on the plot plan of the discharger referenced for each plant in Schedules 2 and 3 and filed with the Ministry.

SCHEDULE 6

DESIGNATED SAMPLING POINTS FOR CHRONIC TOXICITY ASSESSMENT

PLANT NAME	*Sampling Point Number and Description
Albright and Wilson Americas	0100 = Final Discharge to River (Process Effluent)
Cabot Canada Ltd.	0100 = Discharge from Filter Bed to Cole Drain (Process Effluent)
Cytec Canada Inc. (Welland plant)	0400 = Sludge Pond #11 to Miller's Creek (Process Effluent)
The Exolon-ESK Company of Canada	0100 = 24 Inch Outfall at Beaver Dam Rd. (Process Effluent)
General Chemical Canada Ltd.	0200 = Main Drain Effluent to Detroit River (Process Effluent)
ICI Canada Inc.	0300 = Effluent in LEL-2 to River (Combined Effluent)
ICI Canada Inc. - Conpak	0100 = Effluent from Conpak to River (Process Effluent)
International Minerals and Chemicals Corporation (Canada) Limited	0300 = Final Effluent to River (Process Effluent)
Liquid Carbonic Inc. (Courtright)	0100 = Effluent to South Ditch (Process Effluent)
Liquid Carbonic Inc. (Maitland)	0100 = Effluent to River (Process Effluent)
Norton Advanced Ceramics of Canada Inc.	0300 = Sewer C to Welland River (Process Effluent) 0400 = Sewer D to Welland River (Process Effluent)
Nutrite Inc. (Maitland)	0400 = Final Effluent to River (Process Effluent)
Praxair Canada Inc. (Moore)	0100 = Final Effluent to River (Process Effluent)
Praxair Canada Inc. (Sarnia)	0100 = Effluent from Cooling Tower to Cole Drain (Process Effluent)
Praxair Canada Inc. (Sault Ste. Marie)	0100 = Outfall at Safety Drive to River (Process Effluent)
Puritan Bennett Corporation	0100 = Effluent to Creek (Process Effluent)
Sulco Chemical Limited	0100 = Final Effluent to Creek (Process Effluent)
Terra Industries (Canada) Inc.	0200 = Plant Final Effluent to the St. Clair River (Combined Effluent)
UCAR Carbon Canada Inc.	0200 = Government Dock Effluent (Process Effluent)
Washington Mills Electro Minerals Corporation	0100 = Effluent from Queen Lagoon to Welland River (Process Effluent) 0200 = Effluent from the Old Lagoon to Welland River (Process Effluent)
Washington Mills Limited	0100 = Final Effluent to River (Process Effluent)
Welland Chemical Limited	0200 = Effluent from #1 Lagoon (Process Effluent)

* - the designated sampling points for chronic toxicity assessment are identified as to number, name and location on the plot plan of the discharger referenced for each plant in Schedules 2 and 3 and filed with the Ministry.

SCHEDULE 7
REFERENCE PRODUCTS

Plant Name	Products
Albright and Wilson Americas	•Phosphoric Acid •Sodium and Potassium Phosphates
Cabot Canada Ltd.	•Carbon Black
Cytec Canada Inc. (Welland plant)	•Phosphine and Derivatives
The Exolon-ESK Company of Canada Ltd.	•Abrasives
ETI Explosives Technologies International	•Explosives
General Chemical Canada Ltd.	•Soda Ash •Calcium Chloride
ICI Canada Inc.	•Caustic Soda •Chlorine •Hydrogen •Hydrochloric Acid •Chlorinated Paraffins, •Sodium Hypochlorite
ICI Canada Inc. - Conpak	•Packaging of - Acids, Bases, Ammonia, Chlorine
International Minerals and Chemicals Ltd.	•Shutdown Phosphate Fertilizer Facility - Storage Pond Drainage
Liquid Carbonic Inc. (Courtright)	•Liquified Carbon Dioxide
Liquid Carbonic Inc. (Maitland)	•Liquified Carbon Dioxide
Norton Advanced Ceramics of Canada Inc.	•Abrasives
Nutrite Inc.	•Nitric Acid •Ammonium Nitrate •"Nitrogen" Solutions

SCHEDULE 7 CON'T
REFERENCE PRODUCTS

Plant Name	Products
Partek Insulations Ltd.	•Insulation Fibre
Praxair Canada Inc.(Moore)	•Nitrogen Gas
Praxair Canada Inc.(Sarnia)	•Nitrogen Gas
Praxair Canada Inc. (Sault Ste. Marie)	•Gases - Oxygen, Nitrogen, Argon
Puritan Bennett Corporation	•Nitrous Oxide
Sulco Chemicals Limited	•Sulphuric Acid •Packaging of Acids - Hydrochloric, Hydrofluoric, Phosphoric
Terra Industries (Canada) Inc.	•Ammonia •Ammonium Nitrate •Urea •Nitric Acid •"Nitrogen" Solutions
UCAR Carbon Canada Inc.	•Carbon and Graphite Electrodes
Washington Mills Electro Minerals Corporation	•Abrasives
Washington Mills Limited	•Abrasives
Welland Chemical Limited	•Aluminum Chloride •Sodium Hypochlorite •Packaged Chlorine